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Editors

Proceedings of the 1st International Summit Conference on Exercise Science, Sports Management, Outdoor Recreation, and Physical Education, ExSPORT 2024, 28th - 29th August, Malaysia

Exporting Research Insights to Practical Applications in Sports
Turning Challenges into Opportunities

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Preface

The 1st International Summit Conference on Exercise Science, Sports Management, Outdoor Recreation, and Physical Education, taking place online from 28th August – 29th August 2024. This inaugural conference had attracted academic disciplines, professional practitioner, and industry stakeholders from various backgrounds to share their thoughts and disseminate evidence-based findings through scholarly communication.

The theme chosen for this conference "Exporting Research Insights to Practical Applications in Sports: Turning Challenges into Opportunities," is very relevant to the national sports agenda and this is to highlight the importance of engagement between a range of academic disciplines, professional practitioner, and industry stakeholders relevant to sports.

This peer-reviewed conference proceeding highlights high-quality research findings covering four main areas of Sports and Exercise Science (which include Biomechanics, Exercise Physiology, Sports Nutrition, Motor Learning and Control, Strength and Conditioning, Sports Psychology, Health and Wellness, Exercise and Aging, Exercise Rehabilitation, and Pediatric Exercise), Sports Management (topic include such as Event Planning, Facility Management, Sports Law, Ethics in Sports, Sports Broadcasting, Community Programs, Sports Finance, Sports Marketing, and Sports Sponsorship), Outdoor and Recreation (which include areas such Park and Recreation Management, Outdoor Leadership, Adventure Tourism, Wilderness First Aid and Safety, Ecotourism Development, Outdoor Adventure Programming, and Natural Resource Management), and Physical Education (which include areas such as Physical Education Pedagogy, Dance and Movement Studies, Adaptive Physical Education, and Sports Coaching).

The publication of this Proceedings of the 1st International Conference on Exercise Science, Sports Management, Outdoor Recreation, and Physical Education, ExSPORT, 2024, will assist in maximizing the accessibility of readers and the popularity of these papers.

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Contents

A Comparative Analysis of Technical Characteristics Between Top World Ranking vs. Top-One Malaysian Athlete in Men's Single Badminton Matches 2023 World Tour

Arisya Ismail, Muhammad Nabil Esa, Anis Shafira Abdul Harith, Muhamad Noor Mohamed*, Mardiana Mazaulan, Noor Azila Azreen Md Radzi, and Nurul Ain Abu Kassim.

Abstract | This study conducts a comparative analysis of technical characteristics between top world-ranking and Top 1 Malaysia Athletes in men's singles badminton matches during the 2023 World Tour. The objective of this research is to analyse gameplay between two players, providing insights for coaches and athletes to enhance their training and performance techniques. The focus of this study is Viktor Axelsen, the top 1 world ranking, and Lee Zii Jia, the Malaysian athlete. The technical characteristics that frequently been analysed were (serve, drop, net, smash, lob, defence, drive and clear). Variables were obtained using YouTube videos and notational analysis $r = 0.99$ and % of error 0.3%. Mann-Whitney U was used to describe and to determine the difference of the technical characteristic that used by the Top 1 World Ranking and Top 1 Malaysia Athletes, between the groups analyses, significant found out only seven out of 16 (success and unsuccess) which was lob unsuccess ($p = 0.03$, $r = 0.252$), clear success ($p = 0.001$, $r = 0.60$), clear unsuccess ($p = 0.021$, $r = 0.28$), drive unsuccess ($p = 0.001$, $r = 0.46$), defend unsuccess ($p = 0.001$, $r = 0.51$), drop unsuccess ($p = 0.35$, $r = 0.23$) and smash unsuccess ($p = 0.016$, $r = 0.29$). The study revealed that technical characteristics can improve player performance for better tournament results. It highlights the importance of using these characteristics as guides for improving performance. Effective play increases the chances of winning, while poor performance leads to losing matches.

Keywords: *Technical characteristics, men's singles badminton, comparative analysis, notational analysis, performance strategies.*

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I. INTRODUCTION

Badminton is a two-person sport where players use rackets to hit a shuttlecock over a net. Originating from the ancient Chinese game of battledore and shuttlecock, it has evolved into a popular racquet sport [1]. Known for its fast pace and precise shots, badminton demands excellent conditioning and a high level of tactical, technical, and psychological skill [2]. Matches involve intense, short bursts of activity with rest periods [3]. The game, played in singles or doubles, focuses on hitting the shuttlecock where the opponent can't return it [1]. Singles matches are more demanding than doubles, requiring more movement and higher heart rates [4]. Badminton includes five categories, which are men's singles, men's doubles, women's singles, women's doubles, and mixed doubles. In doubles, success also depends on the partners' compatibility. To quantify movement in play, computerized notational analysis is a useful tool for evaluating match characteristics [3]. Over the past 20 years, badminton has undergone significant changes since the Badminton Association of England established official rules in 1893. Notational analysis with video recordings helps coaches and players improve performance [3]. Key performance indicators include serves, drops, nets, smashes, unforced errors, and drives, with past studies noting differences between singles and doubles in timing factors [4]. Successful smashes are particularly challenging for opponents to return [5].

II. METHODS

A purposive sampling technique was used to select participants based on traits essential for this study, comparing the Top-World player with the Top-One Malaysian athlete. For the 2023 Men's Singles Badminton Matches, which took place from January to December, 87 matches (N = 87) from 10 tournaments were analyzed. Data was collected from the BWF official website (https://bwf.tournamentsoftware.com/) and videos on YouTube. Matches include all rounds, from the first to the final. The key technical characteristics analyzed were smash, drive, lob, drop, net, defend, clear, and serve.

III. RESULTS AND DISCUSSION

The Mann-Whitney U test was used to check for differences in technical characteristics because many variables didn't follow a normal distribution [3]. This study aimed to find significant differences in technical characteristics like serve, lob, clear, net, drive, defend, drop, and smash between Viktor Axelsen and Lee Zii Jia. The probability level of 0.05 was used to determine significance [6]. Based on Table 1, it was found that seven technical characteristics (both success and unsuccess) showed significant differences between Viktor Axelsen and Lee Zii Jia in men's singles badminton matches in 2023. However, nine technical characteristics (both success and unsuccess) did not show significant differences. Significant differences between both players can be seen at lob unsuccess, clear success, clear unsuccess, drive unsuccess, defend unsuccess, drop shot unsuccess, and smash unsuccess ($p < 0.05$), while other indicators showed insignificant differences ($p > 0.05$).

The first technical characteristic discussed was lob unsuccess. Data showed that Lee Zii Jia (*mean* = 0.468) makes fewer mistakes compared to Viktor Axelsen (*mean* = 1.075), indicating Lee Zii Jia is better

at executing lobs with fewer errors [7]. Next was a clear success, where Lee Zii Jia (*mean* = 17.128) outperformed Viktor Axelsen (*mean* = 8.975), showing better performance in clear shots. Previous research states that clear shots are crucial, despite not being the most frequent [3]. For clear unsuccess, Viktor Axelsen (*mean* = 1.550) had fewer mistakes than Lee Zii Jia (*mean* = 2.468), suggesting Lee Zii Jia may take more risks with his clears [8]. In drive unsuccess, Viktor Axelsen (*mean* = 0.550) was more consistent than Lee Zii Jia (*mean* = 1.574), indicating better execution of drive shots [2]. For defensive unsuccess, Viktor Axelsen (*mean* = 4.025) performed better than Lee Zii Jia (*mean* = 6.383), showing Lee Zii Jia struggles more with defensive shots [9]. In drop unsuccess, Viktor Axelsen (*mean* = 0.325) had fewer mistakes compared to Lee Zii Jia (*mean* = 0.766), reflecting better control over drop shots. Lastly, in smash unsuccess, Viktor Axelsen (*mean* = 1.425) showed better accuracy than Lee Zii Jia (*mean* = 2.043), indicating Lee Zii Jia might face more challenges with smashes [10].

TABLE 1
COMPARISON OF PERFORMANCE INDICATORS BETWEEN PLAYERS

Test	**Statistic**	***p*-value**		**Effect Size**
Serve Success	Mann-Whitney U 871	0.516	Rank Biserial Correlation	0.0739
Serve Unsuccess	Mann-Whitney U 814	0.143	Rank Biserial Correlation	0.1340
Lobbing Success	Mann-Whitney U 892	0.685	Rank Biserial Correlation	0.0511
Lobbing Unsuccess	Mann-Whitney U 704	0.027	Rank Biserial Correlation	0.2316
Clear Success	Mann-Whitney U 375	< 0.001	Rank Biserial Correlation	0.6016
Clear Unsuccess	Mann-Whitney U 674	0.021	Rank Biserial Correlation	0.2835
Netting Success	Mann-Whitney U 841	0.103	Rank Biserial Correlation	0.1245
Netting Unsuccess	Mann-Whitney U 729	0.066	Rank Biserial Correlation	0.2245
Drive Success	Mann-Whitney U 506	< 0.001	Rank Biserial Correlation	0.4617
Drive Unsuccess	Mann-Whitney U 914	0.798	Rank Biserial Correlation	0.0477
Defend Success	Mann-Whitney U 502	< 0.001	Rank Biserial Correlation	0.4617
Defend Unsuccess	Mann-Whitney U 462	< 0.001	Rank Biserial Correlation	0.5085
Drop Shot Success	Mann-Whitney U 819	0.135	Rank Biserial Correlation	0.1374
Drop Shot Unsuccess	Mann-Whitney U 727	0.035	Rank Biserial Correlation	0.2201
Smash Success	Mann-Whitney U 748	0.023	Rank Biserial Correlation	0.2371
Smash Unsuccess	Mann-Whitney U 666	0.016	Rank Biserial Correlation	0.2915

$p < 0.05$

According to [3], descriptive statistics like mean, minimum, maximum, and standard deviation were used to present the collected data. Figure 1 shows the mean for each variable measured in this study for Viktor Axelsen and Lee Zii Jia. The data reveal that the highest mean and standard deviation were for net success, with Viktor Axelsen at (*mean* ± *SD* = 41.100 ± 17.047) and Lee Zii Jia at (*mean* ± *SD*= 43.809 ± 14.243). The lowest mean and standard deviation were for serve unsuccess, with Viktor Axelsen at (*mean* ± *SD*= 0.325 ± 0.526) and Lee Zii Jia at (*mean* ± *SD* = 0.179 ± 0.380).

Fig. 1 Values for performance indicators

IV. CONCLUSIONS

To conclude, the study found that several technical characteristics, such as serve, drop, net, smash, lob, defense, drive, and clear, affect performance in men's singles badminton. Good performance leads to wins; poor performance leads to losses.

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A Comparative Analysis of Technical Proficiencies: Viktor Axelsen Versus Anders Antonsen in Men's Singles Badminton During the 2023 World Tour

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Abstract | This study conducts a comparative analysis of technical characteristics between top world-ranking and Top 1 Malaysia Athletes in men's singles badminton matches during the 2023 World Tour. The objective of this research is to analyse gameplay between two players, providing insights for coaches and athletes to enhance their training and performance techniques. The focus of this study is Viktor Axelsen, the top 1 world ranking, and Lee Zii Jia, the Malaysian athlete. The technical characteristics that have frequently been analysed were (serve, drop, net, smash, lob, defence, drive and clear). Variables were obtained using YouTube videos and notational analysis r = 0.99 and % of error 0.3%. Mann-Whitney U was used to describe and to determine the difference in the technical characteristics used by the Top 1 World Ranking and Top 1 Malaysia Athletes, between the groups' analyses, significant found out only seven out of 16 (success and unsuccess) which was lob unsuccess (p = 0.03, r = 0.252), clear success (p = 0.001, r = 0.60), clear unsuccess (p = 0.021, r = 0.28), drive unsuccess (p = 0.001, r = 0.46), defend unsuccess (p = 0.001, r = 0.51), drop unsuccess (p = 0.35, r = 0.23) and smash unsuccess (p = 0.016, r = 0.29). The study revealed that technical characteristics can improve player performance for better tournament results. It highlights the importance of using these characteristics as guides for improving performance. Effective play increases the chances of winning, while poor performance leads to losing matches.

Keywords: *Badminton, technical characteristics, Danish player, Mann-Whitney U test, performance analysis.*

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I. INTRODUCTION

Badminton is characterized by high-speed movements and shot executions, which demand high tactical, technical, and psychological abilities as well as a high level of physical conditioning [1]. Badminton is a sport characterized by intermittent efforts of moderate to high intensity, caused by short and repetitive actions [2]. Viktor Axelsen and Anders Antonsen are two prominent figures in men's singles badminton, each with distinct playing styles and technical characteristics. Axelsen is known for his aggressive style of play, characterized by powerful smashes and swift footwork [3]. On the other hand, Antonsen is recognized for his tactical finesse, employing a combination of deceptive shots and strategic court coverage to outmaneuver opponents [3]. In terms of achievements, Axelsen has secured numerous titles, including the World Championships and the All England Open, showcasing his dominance at the highest level of the sport [3]. Technical analysis allows coaches and analysts to dissect the playing styles of players such as Axelsen and Antonsen, identifying their strengths and weaknesses in different areas of the game.

II. METHODS

This study used a non-probability sampling approach, specifically "purposive" sampling, to compare the technical characteristics of renowned Danish badminton players. The men's singles badminton matches for the year 2023, which took place from January to December 2023., were analyzed. The athletes participated in 10 tournaments, and the study included 86 match videos (N = 86), covering all rounds from the first to the final. Data was collected from the Badminton World Federation's (BWF) official website. The study focused on measuring technical characteristics such as smash, drive, lob, net, drop, defend, clear, and serve. Video data for analysis was sourced from YouTube, and world ranking information was obtained from the BWF website.

III. RESULTS AND DISCUSSION

The non-parametric test, which is the Mann-Whitney U test, was used to analyze the data. The Mann-Whitney test was used for variables that did not have a normal distribution. [2]. This is to determine if there were any significant differences in technical characteristics (serve, lobbing, clear, netting, drive, defend, drop shot, and smash) between Viktor Axelson and Anders Antonsen. The value of alpha has been set at 0.05. Significant differences were found in six out of 16 technical categories (both success and unsuccess rates). However, 10 technical characteristics didn't show significant differences. These included serve success and unsuccess, lob success and unsuccess, net success and unsuccess, drive success, defend success, and smash success and unsuccess. The *p*-value for these 10 characteristics was greater than 0.05. (Table 1). The first technical characteristic discussed in this study was clear success. Anders Antonsen (*mean* = 17.50) makes more successful clear shots than Viktor Axelsen (*mean* = 8.98). The clear shot is important in badminton because it helps move opponents to the backcourt, giving players time to get into an attacking position [4]. The study also looked at clear unsuccess. Viktor Axelsen has a lower mean value of clear unsuccess (*mean* = 1.55) compared to Anders Antonsen (*mean* = 3). Failing to execute a clear shot well can lead to losing points, giving the opponent an advantage [5]. Next, the study discussed drive

unsuccess. Viktor Axelsen (*mean* = 0.55) had fewer unsuccessful drives compared to Anders Antonsen (*mean* = 1.39). A higher rate of unsuccessful drives, as seen with Antonsen, can indicate difficulties in maintaining precision and control under pressure. The drive shot is crucial for its speed and effectiveness, especially in doubles matches [6]. For unsuccessful defenses, Viktor Axelsen (*mean* = 4.03) had fewer unsuccessful defenses compared to Anders Antonsen (*mean* = 7.33). Effective defense relies on good anticipation and positioning [7]. Poor defensive shots can result in losing points [8]. Another characteristic discussed was drop shot success. Viktor Axelsen (*mean* = 7.33) had fewer successful drop shots compared to Anders Antonsen (*mean* = 15.83). A drop shot requires precision and finesse and is a key technique in badminton [9]. Lastly, in drop shot unsuccess, it shows Viktor Axelsen (*mean* = 0.33) and Anders Antonsen (*mean* = 0.72). The drop shot, along with other shots like the smash, net shot, and clear, are essential components of a player's arsenal in badminton [10]. The lower unsuccess rate for Viktor Axelsen implies that he likely has better precision and consistency in performing drop shots.

TABLE 1
MANN-WHITNEY U TEST RESULT

Test	**Statistic**	***p*-value**		**Effect Size**
Serve Success	Mann-Whitney U 848	0.463	Rank Biserial Correlation	0.0788
Serve Unsuccess	Mann-Whitney U 890	0.744	Rank Biserial Correlation	0.0326
Lobbing Success	Mann-Whitney U 828	0.425	Rank Biserial Correlation	0.1005
Lobbing Unsuccess	Mann-Whitney U 797	0.249	Rank Biserial Correlation	0.1342
Clear Success	Mann-Whitney U 335	< 0.001	Rank Biserial Correlation	0.6364
Clear Unsuccess	Mann-Whitney U 478	< 0.001	Rank Biserial Correlation	0.4804
Netting Success	Mann-Whitney U 811	0.345	Rank Biserial Correlation	0.1190
Netting Unsuccess	Mann-Whitney U 763	0.167	Rank Biserial Correlation	0.1712
Drive Success	Mann-Whitney U 754	0.151	Rank Biserial Correlation	0.1804
Drive Unsuccess	Mann-Whitney U 568	0.001	Rank Biserial Correlation	0.3832
Defend Success	Mann-Whitney U 831	0.443	Rank Biserial Correlation	0.0967
Defend Unsuccess	Mann-Whitney U 309	< 0.001	Rank Biserial Correlation	0.6647
Drop Shot Success	Mann-Whitney U 256	< 0.001	Rank Biserial Correlation	0.7223
Drop Shot Unsuccess	Mann-Whitney U 727	0.051	Rank Biserial Correlation	0.2098
Smash Success	Mann-Whitney U 838	0.477	Rank Biserial Correlation	0.0897
Smash Unsuccess	Mann-Whitney U 755	0.137	Rank Biserial Correlation	0.1793

$p < 0.05$

Based on past journals [2], descriptive statistics (mean, minimum, and maximum standard deviation) were used to present the data collected. Based on the data collection, the highest amount of mean and standard deviation was netting success for both Viktor Axelsen (*mean*± *SD* = 41.100 ± 17.047) and Anders Antonsen (*mean*± *SD* = 44.522 ± 15.722), while the lowest amount of mean and standard deviation was serve unsuccess for both Viktor Axelsen (*mean*± *SD* = 0.325 ± 0.526) and Anders Antonsen (*mean*± *SD* = 0.304 ± 0.553).

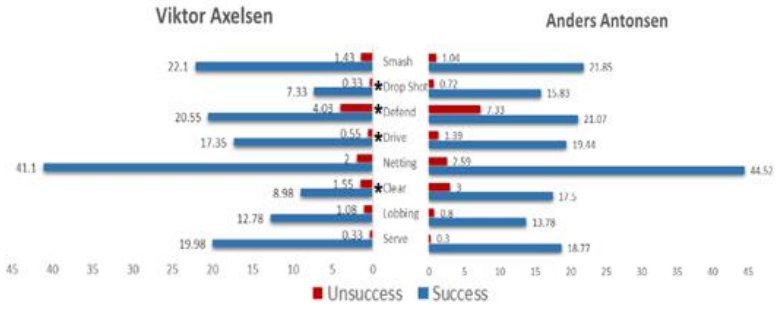

Fig. 1 Mean value for performance indicators

IV. CONCLUSIONS

In conclusion, clear success, clear unsuccess, drive unsuccess, defend unsuccess, drop shot success, and drop shot unsuccess showed a significant difference between Viktor Axelsen and Anders Antonsen. The study demonstrated that technical characteristics are essential for determining the performance of badminton players.

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A Preliminary Study on Assessing Recreation Resource Impacts at GeoBudaya Berkeley Trail at Lenggong Geopark, Perak, Malaysia

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Abstract | Recreation ecology is a field of study that assesses, examines and monitors any impact due to visitors coming to carry out recreational activities, especially in natural areas. In line with the recognition of Lenggong Geopark as a National Geopark on 16 September 2021, it is sure to be the primary destination focus for visitors who want to enjoy the uniqueness of geological heritage in this geotourism area. In fulfilling the visitor's desire to engage more closely with these ecological heritage resources, the trail is a specific medium that connects the resources and the prospective visitors who are interested. However, the large number of visitors can cause problems with the overall quality of the trail system, causing undesirable changes and damaging components of natural resources such as soil, vegetation, wildlife, and water. This problem has directly affected the integrity of the management in maintaining recreational benefits, even creating conflicts between visitors and difficulties in achieving management sustainability. Therefore, this study aims to assess the conditions along the Berkeley GeoBudaya Trail and subsequently provide the management with an understanding of the current status of the trails so that appropriate actions can be taken to curb damage from continuing to occur. Through data collection, 24 sampling points were obtained with a consistent distance gap of 50 meters, each from one to another, making the entire distance of the Berkeley GeoBudaya Trail 1.2 kilometers long. The assessment was carried out using three main techniques, Rapid Survey Technique, Census Sampling Technique, and Cross-sectional Measurements, to determine the factors influencing the recreation resource impact of the trail. The findings of the study show that the current status of recreation resource impacts on the Berkeley GeoBudaya Trail is between low to moderate, preserved, and the environment still retains its naturalness. The significant contribution of such an assessment is believed to be advantageous to the management in ensuring the sustainability of the trail system by accommodating visitation while enhancing the protection of natural resources along the Berkeley GeoBudaya Trail.

Keywords: *Recreation ecology, recreation resource impacts, trail impact assessment, GeoBudaya Berkeley Trail.*

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I. INTRODUCTION

Lenggong Geopark has been recognized as a Malaysian National Geopark since December 16, 2023. The Geopark represents an area of international importance with high-value geological heritage and aesthetic value and an integrated concept that includes conservation, education, and the local economy [1]. Hence, the Geopark is most likely to become one of the most visited destinations among visitors seeking to enjoy the uniqueness of the geological heritage experience. The trail is a specific medium that connects the resources and the interested prospective visitors [2]. In this case, the particular route is known as the Berkeley GeoBudaya Trail. However, the large number of visitors can cause problems with the overall quality of the trail system, causing undesirable changes and damaging components of ecological heritage resources such as soil, vegetation, wildlife, and water [3][4]. This problem has directly affected the integrity of the management in maintaining recreational benefits, even creating conflicts between visitors and difficulties in achieving management sustainability. Exploring recreation resource impacts is vital because trail-related recreation activities such as hiking and wildlife viewing are popular and receive some of the most intensive visitor use within the parks [5]. The outcome of this research contributes to determining the causes and consequences of recreation resource impacts, which are challenging and highly site-specific. Thus, recreation resource impacts are a concern for managers because the trail may become difficult or unsafe, aesthetic aspects of ecological heritage resources may be diminished, and substantial funding or staffing may be required to repair or maintain trails. Therefore, this study aims to assess the conditions along the Berkeley GeoBudaya Trail and subsequently provide the management with an understanding of the current status so that appropriate actions can be taken to prevent damage from continuing to occur.

II. METHODS

This study applied the structured observation method using inventory form and was supported by three techniques. The Rapid Survey Technique was conducted to collect data within a 50-meter distance from one sample point to another, and the Census Sampling Technique involved census problem areas at the entire trail system. Cross-sectional measurement was used to understand trail depth and width changes. Through data collection, 24 sampling points were obtained, making the entire distance of the Berkeley GeoBudaya Trail 1.2 kilometers long. An expert judgement has sought the content of the inventory form before the data is collected on-site. Therefore, the inventory form comprises ecological aspect parameters divided into sections focusing on impacts on soil, vegetation, wildlife, and water; trail width, transect line depth, and overall trail condition [6] – [8]. Each of the chosen parameters is rated into four classes: 1 = high impact, 2 = critical impact, 3 = moderate impact, and 4 = low impact, respectively.

III. RESULTS AND DISCUSSION

A. The trail condition is based on the width and depth.

Trail width and depth have been described as part of the trail corridor, which directly supports most recreational traffic in natural settings. However, it is not applicable when the sample point is not situated on the trail surface [9]. The result shows that trail width readings range from 73 cm to 475 cm throughout

the trail (Table 1). Based on the record, only 8% (2 points) stated reading below 90 cm. Significantly, 98% (22 points) marked the reading as more than 90 cm in width, and this represented excessive trail width because the trail exhibits a greater than 90 cm expansion in width that is attributable to recreational uses, such as walking around tree falls, wet or muddy areas, eroded areas and multiple treads [10][11]. This result was then supported by the reading of the trail depth, which was calculated in three different sections of the trail, which are the middle trail depth (D), the right side of trail depth (D1) and the left side of the trail depth (D2).

TABLE 1
THE WIDTH AND DEPTH OF BERKELEY GEOBUDAYA TRAIL

	Minimum (cm)	**Maximum (cm)**	**Mean (cm)**
Trail Width	73	475	210
Trail Depth (D)	0	10	3
Trail Depth (D1)	0	10	2
Trail Depth (D2)	0	13	3

Contradicting the trail width result, the mean depth in the middle of the trail is low (3 cm) and almost equal to the readings on the right (2 cm) and left (3 cm). The overall segmentation has a 100% minimum trail depth measurement of 0 cm. Still, the maximum trail depth measurement is classified as highly impacted for specific points because the depth recorded up to more than 8 cm deep, such as the readings on the middle trail depth (D), which stated 25% (6 points) reaches 10 cm, the right side of the trail depth (D1) represented only 8% (2 points), and the left side of the trail depth (D2) was 21% (5 points).

B. The overall assessment of recreation resource impacts.

Table 2 represents the comprehensive evaluation of recreation resource impacts at the Berkeley GeoBudaya Trail, consisting of four variables for soil, ten for vegetation, four for wildlife, and four for water resources.

TABLE 2
THE OVERALL ASSESSMENT OF RECREATION RESOURCE IMPACTS

Impact	Variables	Level of Impact
Soil	Problem areas	Moderate
	Soil erosion	Low
	Soil drainage	Low
	Soil exposure	Moderate
Vegetation	Root exposure	Moderate
	Loss of vegetation	Moderate
	Canopy coverage	Moderate
	Damages to vegetation	Moderate
	Tree stumps, fallen trees and lean trees	Moderate
	Vegetation density	Moderate
	Vegetation composition	Moderate
	Unique and endangered species	Low
	Mechanical damage	Moderate
	Exotic species and weeds	Low
Wildlife	Wildlife disturbance	Low
	Wildlife harvesting	Low
	Loss or modification of wildlife habitats	Low
	Wildlife dependency on food	Low
Water	Contamination of useable water resources	Low
	The presence of bacteria	Low
	Water quality	Low
	Solid suspended matter	Low

Undoubtedly, a “low level of impact” of wildlife disturbance, wildlife harvesting, habitat loss or modification, and wildlife reliance on food were the outcomes of the impact on wildlife. Similarly, the impact on water is shown as having a “low level of impact” for every parameter, including bacteria from leftover food and domestic animal waste, water quality changes, and solid suspended matter. These factors all contribute to the contamination of useable water resources in natural areas caused by erosion of riverbanks and camping activities. Impacts on soils occur when changes in soil compaction, chemical and microbiological properties and soil loss occur due to recreational activities along the trail [12]. There are equal levels of impact recorded for “low level of impact” classified for soil erosion and soil drainage, while “moderate level of impact” shown by the variables of problem areas and soil exposure. Soil exposure is clearly understood as the ground condition with very little or no organic litter (partially decomposed leaf, needle, or twig litter) or vegetation cover within the site boundaries [11]. Lastly, for vegetation, the result indicated that 80% of the impact variables were confirmed at the “moderate level of impact” compared to only two variables, which are unique and endangered species and exotic species and weeds. The findings of the study show that the current status of recreation resource impacts on the Berkeley GeoBudaya Trail is between low to moderately preserved, and the environment still retains its naturalness.

IV. CONCLUSIONS

In conclusion, the Berkeley GeoBudaya Trail at Lenggong Geopark is projected to become one of the most visited destinations for those seeking the uniqueness of the geological heritage experience. Referring to the findings that indicated the environment remained naturally preserved, it is vital for the management to conduct a long-term recreation resource impacts assessment and monitoring together with the implementation of management actions designed to maintain standards of quality to ensure the sustainability of the trail in accommodating visitation to meet the user's expectations, as this will reflect their memories and experience while enhancing natural resource protection.

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Acute Effect of Single Bout Exercise Modalities (Open-skills vs Closed-skills) on Trail-Making Task in Recreationally Active Older Adults

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Abstract | This study investigates the cognitive benefits of acute exercise modalities in elderly individuals, focusing on engagement in badminton (open-skills) versus closed-skill (e.g., swimming, cycling and running) exercises, compared to sedentary activity. A total of 67 participants aged 60 and above were 16he16ious16s16 into three groups: badminton (open-skills) (BAD, n = 21), closed-skill exercise (CSP, n = 22), and a sedentary control (CON, n = 24) group. The study evaluated the cognitive impact of a single exercise bout on these tasks. Results revealed that participation in badminton exercises significantly improved executive function and working memory compared to closed-skill and passive activities. Specifically, in the N-Back Task, the BAD group showed a reaction time of 810.4 m/s and 75.2% accuracy, outperforming the CSP (reaction time: 826.2 m/s, accuracy: 70.8%) and CON groups (reaction time: 840.8 m/s, accuracy: 56.2%). Similarly, in the TMT-B, the BAD group (46.7 seconds) outperformed the CON group (64.0 seconds). Accurately, the BAD group showed notable cognitive enhancements post-exercise, particularly in working memory and executive functions. For instance, the BAD group improved in TMT-B from 46.7 seconds to 45.4 seconds post-exercise, while the CSP and CON groups did not exhibit similar improvements. These findings suggest that the type of physical activity plays a critical role in cognitive health, with badminton offering superior benefits. The study highlights the importance of exercise modality in cognitive function enhancement among the elderly, challenging the notion that all forms of physical activity are equally beneficial for cognitive health.

Keywords: *Cognitive function, exercise, open-skills, close-skills, older adults.*

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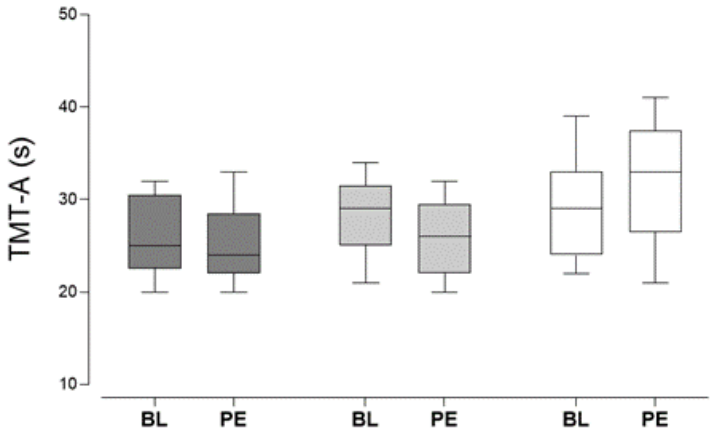
I. INTRODUCTION

The relationship between physical exercise and cognitive function throughout the lifespan has been extensively documented, particularly in the context of aging [1]. Over the past two decades, research has emphasized the positive impact of exercise on cognitive health, with evidence indicating that physical activity can enhance executive function, as measured by the Trail-Making Test (TMT) [2] [3]. However, despite some studies that have demonstrated a positive correlation between exercise and TMT performance, the broader effects of physical activity on cognitive health are not yet fully understood.

II. METHODS

Ninety-nine elderly (> 60 years) participated in this quasi-experimental study and were divided into RBP (65.7 ± 4.7), CSP (65 ± 4.4) and CON (64.2 ± 2.6) groups. Following baseline (BL) assessments, each group was assigned an acute exercise session to achieve equivalent MET value. After an acute exercise session, subjects were required to complete all the questionnaire and cognitive assessment using TMT [4].

III. RESULTS AND DISCUSSION



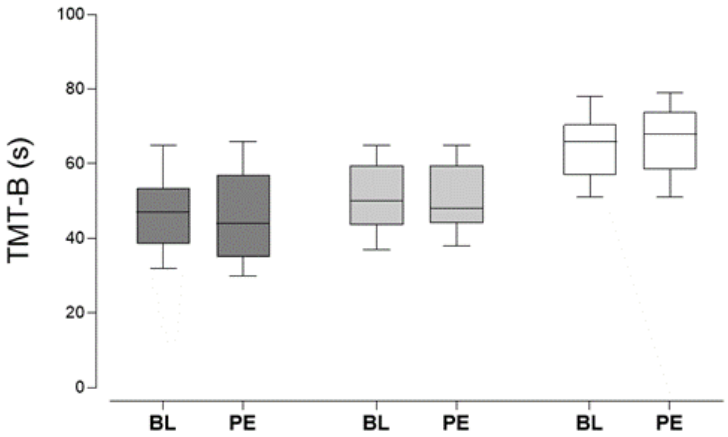


Fig. 1 Differences Δ in TMT-A and TMT-B performance in BL and PE

TMT-A revealed a significant difference in BAD vs CON (25.1 ± 3.8 vs 32.3 ± 5.9; $p < 0.05$) in PE as compared performance in BL. However, no significant differences were found for BAD vs CSE (25.1 ± 3.8 vs 26.1 ± 3.9; $p < 0.05$) and CSE vs CON (26.1 ± 3.9 vs 32.3 ± 5.9; $p < 0.05$) in BL and PE. (Fig 1). The analysis of TMT-B showed no significant differences were found between all the groups, from BL to PE. The current finding is contrary to previous studies that have suggested that a structured acute exercise program improved frontal lobe functions, including attention and working memory [5]. Accordingly, [6] indicated that exercise had a detrimental effect on cognitive performance during exercise but improved cognitive performance after exercise.

IV. CONCLUSIONS

Acute exercise provides slight improvement in Trail-making tasks. Future research should investigate the underlying mechanism, as well as the acute effects and potential benefits across different populations and exercise types.

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Acute Effects of Barbell Hip Thrust on Speed and Power Among Volleyball Athletes

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Abstract | This study investigates the acute effects of barbell hip thrust (BHT) on speed and power among volleyball athletes. Twenty-four volleyball players (N=24) were selected to become the subjects of this study. Subjects were divided into two groups: the experimental group (EG) and the control group (CG). Forty-meter (40-m) sprint test and vertical jump test were used to measure speed and power. The study involved the EG doing BHT exercises, and the CG performed regular training. The EG did 3 sets of 5 repetitions using 80% of their one-repetition maximum (1RM) for BHT, with a 3-minute rest between sets. The post-test was conducted 14 minutes after the intervention. Similar procedures were carried out for speed and power variables on different occasions. The results revealed a significant improvement in speed $\{t\,(22) = 2.18, p = 0.041, p < 0.05\}$ and power $\{t\,(22) = 2.23, p = 0.037, p < 0.05\}$ for the experimental group (EG) compared to the control group (CG). Specifically, the EG demonstrated a speed of 0.40 ± 0.11 sec, whereas the CG showed a speed of 0.30 ± 0.11 sec. Regarding power, the EG scored much higher, with 2.75 ± 0.67 cm, compared to the CG's 2.22 ± 0.49 cm. These findings showed that the acute implementation of BHT can enhance speed and power in volleyball athletes and provide a valuable tool for volleyball training programs focusing on improving explosive performance.

Keywords: *Barbell hip thrust, speed, power, volleyball, PAP.*

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I. Introduction

Volleyball is among the world's most popular team sports, distinguished by explosive movement patterns and flexible positioning. The outcome of a volleyball game is determined by the best mix of motor and technical-tactical elements [1]. To compete at a high level, volleyball players must acquire and maintain a variety of physical fitness attributes. The primary goal of volleyball training is to improve vertical jump height and jump speed [8]. Jumping along with the appropriate strategies influences the efficacy of attacking, serving, or blocking [2]. Strength training is one of the methods to increase physical performance and reduce the risk of injuries in sports. One of the methods, post-activation potentiation or, in short, PAP, is a physiological or neuromuscular phenomenon characterized by an immediate increase in muscular performance and muscle activation, culminating in voluntary force augmentation measured several minutes after high-intensity muscle contractions [3]. The implementation of PAP aims to increase muscular strength and power in response to a conditioning activity, such as heavy-loaded (80-90% 1-RM) resistance exercises with free weights or variable resistance training [4]. Exercises like the barbell hip thrust may be used to maximize the phenomenon of PAP, which can improve speed and explosive power in volleyball [5].

II. Methods

A purposive sampling technique and pre-test and post-test quasi-experimental design were used for this study. This study investigates the acute effects of barbell hip thrust (BHT) on speed and power among volleyball athletes. Twenty-four volleyball players ($N = 24$) were selected to become the subjects of this study. Subjects were divided into the experimental group (EG) and the control group (CG). Forty-meter (40-m) sprint and vertical jump tests were used to measure speed and power. The study involved the EG doing BHT exercises, and the CG performed regular training. The EG did 3 sets of 5 repetitions using 80% of their one-repetition maximum (1RM) for BHT, with a 3-minute rest between sets. The post-test was conducted 14 minutes after the intervention. Similar procedures were carried out for speed and power variables on different occasions. A standard score sheet was used to record the data, and the score differences for speed and power between the two groups were compared to determine any significant differences.

III. Results and Discussion

The Independent Samples T-Test test was used to compare the differences between the two groups. This study aimed to find significant differences in speed and power between EG and CG. The significance level of 0.05 was used to determine significance. If the *p*-value was 0.05 or less, it indicated a significant difference, so we rejected the null hypothesis. If the *p*-value was greater than 0.05, we accepted the null hypothesis, meaning there was no significant difference.

TABLE 1
FORTY-METER SPRINT TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

	Group	*N*	Mean (SD)	*t*	*df*	*p-value*
Forty Meter Sprint	Experimental	12	0.40 (0.11)	2.18	22	0.041
	Control	12	0.30 (0.11)			

TABLE 2
VERTICAL JUMP TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

	Group	*N*	Mean (SD)	*t*	*df*	*p-value*
Vertical Jump Test	Experimental	12	2.75 (0.67)	2.23	22	0.037
	Control	12	2.22 (0.49)			

The results revealed a significant improvement in t (22) = 2.18, p = 0.041, $p < 0.05$ in speed and t (22) = 2.23, p = 0.037, $p < 0.05$ for power for the experimental group (EG) compared to the control group (CG). Specifically, the EG demonstrated a difference in speed time reduction of 0.40 ± 0.11 sec, whereas the CG showed a speed of 0.30 ± 0.11 sec. Regarding power, the EG scored much higher, 2.75 ± 0.67 cm, compared to the CG's 2.22 ± 0.49 cm. These findings showed that the acute implementation of BHT can enhance speed and power in volleyball athletes and provide a valuable tool for volleyball training programs focusing on improving explosive performance [1].

In this research, post-activation potentiation (PAP) induced by barbell hip thrust (BHT) gives the improvement of speed and sprint performance in volleyball athletes [9]. The BHT is said to have the potential to enhance speed performance as well because the exercise incorporates the hip extensors to increase horizontal force production [6]. The horizontal force is very prominent when lateral movements in volleyball games because it shortens the time the player moves across the volleyball court. The BHT also improves explosive power through vertical jump [7]. The positive performance of the vertical jump requires a few factors that can be highlighted. The factors are the initial exit velocity, explosive force, mechanical power of the lower limb, and the speed of leaving the ground, thus leading to a greater height during the jump motion [5].

IV. CONCLUSIONS

In conclusion, this study examined the acute effect of barbell hip thrust (BHT) exercise on speed and power among volleyball athletes. There was a significant effect on the speed and power performance of BHT exercise among the volleyball athletes in UiTM Seremban. Implementing PAP effects induced by strength training, such as barbell hip thrust, has been proven to improve speed and power among volleyball athletes. The BHT is good training to improve skills performance such as jumping ability and sprinting speed in sports that require a lot of jumping and short sprinting, such as volleyball, badminton, and basketball [7]. An athlete's ability to run, jump, or change direction can affect their performance during a game and the outcomes of the matches. Different kinds of training programs or using different volumes and intensities of training can be used to improve other physical fitness skills [10]. The BHT exercise has proven to have positive effects and improve speed and power among volleyball athletes by implementing

PAP effects. The study's findings can prove and be very helpful to coaches and trainers in creating efficient warm-up plans and conditioning methods for volleyball athletes, to enhance explosive power and speed movement and improve match performance.

ACKNOWLEDGMENTS The physical performances through tactical and technical is very important in volleyball. This study is important because it helps coaches and athletes improve their performance. Coaches can use this information to better player development, strategies, and coaching for the volleyball team. Athletes can gain insights, criteria, and motivation to enhance their skills and compete at high levels. This will also help to understand teamwork and overall performance in volleyball.

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Acute Effects of Heavy Resistance Band on Shooting Speed Among Futsal Players

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Abstract | This study examined the acute effects of heavy resistance bands on shooting speed in futsal players. Thirty-two (N = 32) university futsal players were split into control and experimental groups. Pre- and post-tests were conducted, with the experimental and control groups performing shooting speed measurements both with and without the heavy resistance band. The shooting speed was measured before and after the intervention using a 10-meter shooting test. Results showed that the experimental group demonstrated a significant improvement in shooting speed (2.00 ± 1.065 m/s) compared to the control group (1.75 ± 1.095 m/s). However, the difference between the groups was insignificant, t (30) = 0.665, p = 0.18. Despite this, heavy resistance band training enhanced muscle action and strength, improving shooting performance. In conclusion, while the observed improvement in shooting speed was not statistically significant, incorporating heavy resistance bands into training programs may offer potential benefits for enhancing shooting speed and overall athletic performance in futsal players. Further research with larger sample sizes and varied training protocols is recommended to confirm these findings and provide more definitive training guidance for coaches and players.

Keywords: *Shooting speed, heavy resistance band, futsal, strength training.*

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I. INTRODUCTION

Futsal is a dynamic form of indoor or outdoor football, featuring five players per team, including a goalkeeper. Popular for its similarity to football, futsal requires precise skills, tactics, and shooting ability due to the confined space of indoor courts. Winning in futsal demands accurate passing and fast shooting [1]. Players and coaches explore new training methods to enhance performance as the sport grows, including resistance band training. Resistance bands, known for their ease of use and versatility, offer various resistance levels, providing dynamic strength training that activates a full range of muscle movements [2]. Futsal players now incorporate resistance band exercises to improve shooting skills. This study focuses on the impact of resistance band training on shooting speed in futsal. Strength training is crucial for improving shooting skills in futsal, where quick decisions and accurate shots are essential for success [3]. Targeted strength training exercises enhance the force and quickness of shots by focusing on key muscles like the quadriceps, hamstrings, glutes, and calves [4]. Additionally, strength training improves stability, balance, and coordination, contributing to consistent shooting performance [5]. In futsal, where shooting speed is an important factor in success, studying the influence of certain training approaches on this performance statistic is key. The efficiency of resistance bands among elite university futsal players is demonstrated by their influence on leg strength [6]. However, the usage of resistance bands in terms of elasticity is lacking, and only studies have been done using elite futsal players instead of ordinary futsal players. Thus, the current study aims to measure the effect of heavy resistance band training on leg muscle power and shooting speed through pre-test and post-test assessments.

II. METHODS

A convenient sampling technique and pre-test and post-test quasi-experimental design were used for this study. Thirty-two ($N = 32$) university futsal players were split into control (CG) and experimental groups (EG). Pre- and post-tests were conducted, with the EG and CG performing shooting speed measurements with and without the heavy resistance band. The shooting speed was measured before and after the intervention using a 10-meter shooting test. This study aims to determine the acute effects of heavy resistance bands on shooting speed. The EG partook in the exercises using a resistance band, while the CG did not use a resistance band in the exercise. Before having the exercise, both groups were required to have a 10-meter shooting test as a pre-test, and after the intervention, both groups had a 10-meter shooting test as post-test. After the pre-test, both groups need to do a total of 3 sets of 10 repetitions of squat jump, 2 sets of 20 repetitions of lateral shuffle, 3 sets of 15 repetitions of side repetitions of 15 repetitions of forward lunges, 2 sets of 30 meters of sprinting, and 3 sets of 20 repetitions of knee drive with a resting period gap for 2 minutes between sets – the post – test was held after 14 minutes of the intervention. A standard score sheet was used to record the data, and the score differences for shooting speed between the two groups were compared to determine any significant differences.

III. RESULTS AND DISCUSSION

The independent sample t-test was used to compare the differences between the two groups. This study aimed to find significant differences in shooting speed between EG and CG. The significance level

of 0.05 was used to determine significance. If the *p*-value was 0.05 or less, it indicated a significant difference, so we rejected the null hypothesis. If the *p*-value was greater than 0.05, we accepted the null hypothesis, meaning no significant difference existed.

TABLE 1
EXPERIMENTAL GROUP AND CONTROL GROUP RESULT

Group	***Mean***	***Std. Deviation***
EG	2.00	1.065
CG	1.75	1.095

TABLE 2
10-METRE SHOOTING TEST BETWEEN EXPERIMENTAL AND CONTROL GROUP

Variable	***t***	***df***	**Sig. (2 tailed)**	**Mean Different**	**Std. Error Difference**
Shooting Speed	0.665	30	0.518	0.25	0.38

Results showed that the experimental group significantly improved shooting speed (2.00 ± 1.065 m/s) compared to the control group (1.75 ± 1.095 m/s). The results of this study also align with the findings that show the effect of the resistance band and an improvement in shooting among football players. Significant improvements were detected in velocity in the training group [7]. This considerable enhancement in muscle strength, well with previous investigations, found that leg muscle strength could be improved through resistance band training, which was studied using 60 older patients in 48 weeks to improve knee extension (muscle strength); the change in knee extension strength from baseline was significantly increased [8]. This finding supports the initial hypothesis that heavy resistance band training enhances shooting speed, a critical skill for futsal players. However, the difference between the groups was insignificant (t (30) = 0.665, p = 0.18). Despite this, heavy resistance band training enhanced muscle action and strength, improving shooting performance. In this research, the heavy resistance band improved shooting speed performance in futsal players. The heavy resistance band can also enhance explosive power performance because the exercise incorporates the quadriceps that help increase knee extension to get explosive movements [10]. Leg power is very prominent when making explosive movements in futsal games because it shortens the time when the player wants to shoot the ball when having a chance to score [11]. The factors are the initial velocity of exit, explosive force, and mechanical power of the lower limb of leaving the ground, thus leading to greater power during the futsal game, especially when having a chance of scoring [9].

IV. CONCLUSIONS

In conclusion, while the observed improvement in shooting speed was not statistically significant, incorporating heavy resistance bands into training programs may offer potential benefits for enhancing shooting speed and overall athletic performance in futsal players. Further research with larger sample sizes

and varied training protocols is recommended to confirm these findings and provide more definitive training guidance for coaches and players.

ACKNOWLEDGMENTS: The physical performances through tactical and technical is very important in futsal games. This study is important because it helps coaches and athletes improve their performance. Coaches can use this information to better player development, strategies, and coaching for futsal teams. Athletes can gain insights, criteria, and motivation to enhance their skills and compete at high levels. This will also help to understand teamwork and overall performance in futsal.

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An Analysis of Physical Fitness During Pre-Competitive Phase Among Young Athletes

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Abstract | The pre-competitive phase represents a crucial period in an athlete's training cycle, during which the emphasis transitions from building foundational fitness to refining specific skills and optimizing overall physical performance. Young athletes require customized training strategies to enhance their physical fitness, preparing them for the rigours of competition and enabling them to excel in their respective sports. This study aims to evaluate the physical fitness levels of young athletes during the pre-competitive phase, offering insights into the efficacy of current training practices and pinpointing areas for potential improvement. A total of 209 SUKMA athletes participated in this study, undergoing five fitness tests designed to measure various aspects of their physical fitness: body mass index (BMI), sit-and-reach test, Yo-Yo endurance test (YYET), countermovement jump test (CMJ), and one-minute push-up test. These assessments were conducted before and after the athletes' preparatory phase to evaluate changes in BMI, flexibility, cardiovascular endurance, muscular power, and muscular endurance. The results revealed significant differences in muscular power, flexibility, muscular endurance, and cardiovascular endurance ($p < 0.001$) between the pre-and post-testing phases. However, BMI did not show any significant changes. These findings highlight the effectiveness of the pre-competitive training phase in enhancing key physical fitness components, although BMI remained unaffected. Future research should focus on further elucidating strategies to optimize young athletes' physical health and performance during this pivotal pre-competitive period, ensuring they are adequately prepared for competition demands.

Keywords: *Physical fitness, pre-competitive phase, young athletes, fitness assessment.*

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I. Introduction

Physical fitness plays a crucial role in the development and performance of young athletes across various sports disciplines. Studies have shown that traditional sports interventions can significantly enhance physical fitness levels among young athletes, leading to improvements in components such as multi-stage endurance, shuttle run, and flexibility [1]. Additionally, assessments conducted on young alpine ski racers have highlighted the importance of evaluating physical fitness attributes like jump height, maximal heart rate, and cycling workload during the pre-competitive phase to tailor training programs effectively [2]. Furthermore, research on freestyle wrestlers emphasizes the need for continuous monitoring and analysis of general physical fitness indicators to optimize training methods and enhance overall athletic preparedness, especially during the initial stages of training [3]. Young athletes require customized training strategies to enhance their physical fitness, preparing them for the rigors of competition and enabling them to excel in their respective sports [4]. This study aims to evaluate the physical fitness levels of young athletes during the pre-competitive phase, offering insights into the efficacy of current training practices and pinpointing areas for potential improvement.

II. Methods

A total of 209 SUKMA athletes ($N = 209$) participated in this study, undergoing five fitness tests designed to measure various aspects of their physical fitness: body mass index (BMI), sit-and-reach test, Yoyo endurance test (YYET), countermovement jumps test (CMJ), and one-minute push-up test. These assessments were conducted both before and after the athletes' preparatory phase to evaluate changes in BMI, flexibility, cardiovascular endurance, muscular power, and muscular endurance.

III. Results and Discussion

Results in Table 1 revealed significant differences in muscular power, flexibility, muscular endurance, and cardiovascular endurance ($p < 0.001$) between the pre- and post-testing phases. However, BMI did not show any significant changes. These findings highlight the effectiveness of the pre-competitive training phase in enhancing key physical fitness components, although BMI remained unaffected.

TABLE 1
CHANGES IN PHYSICAL FITNESS COMPONENTS PRE- AND POST-TESTING PHASE AMONG YOUNG ATHLETES

Variables	**Pre-Mean (*SD*)**	**Post Mean (*SD*)**	***p*-value**
CMJ	39.81 (10.75)	42.10 (11.15)	< 0.001
Sit-and-Reach	38.19 (6.66)	39.37 (6.49)	< 0.001
1 min. Push-up	21.56 (12.36)	23.86 (12.62)	< 0.001
YYET	39.49 (7.57)	40.91 (7.77)	< 0.001
BMI	21.66 (4.07)	21.83 (4.08)	0.06

The results from the physical fitness tests conducted during the pre-competitive phase among young athletes reveal several key insights into their physical conditioning. Significant improvements were observed in all measured fitness components except for Body Mass Index (BMI), which showed no significant change.

The significant increase in muscular power, as evidenced by the Countermovement Jump (CMJ), aligns with previous research emphasizing the effectiveness of targeted strength and conditioning programs during pre-competitive phases [5]. Studies have shown that structured training regimens, such as dynamic conditioning contractions, can lead to notable enhancements in power output, jump height, and overall neuromuscular performance [6]. Additionally, monitoring tools like CMJ have been instrumental in assessing lower body fatigue and readiness in athletes across various sports, indicating the importance of tracking these parameters throughout a competitive season to optimize performance [7]. The findings collectively highlight the value of tailored strength and conditioning interventions in enhancing muscular power and performance, underscoring the benefits of targeted training programs in improving athletic outcomes during pre-competitive phases.

The enhancement in flexibility is consistent with studies showing that flexibility training, when integrated into regular conditioning routines, leads to improved range of motion and reduced injury risk [8]. Flexibility is especially important in sports that demand a wide range of motion, and these results suggest that the pre-competitive phase effectively addresses this need. The effectiveness of endurance training strategies during the pre-competitive phase can be reflected in the increase in muscular endurance, as demonstrated by the push-up test results [9]. Endurance training plays a crucial role in enhancing physical performance and preparing athletes for competition [2]. The significant improvement in cardiovascular endurance, indicated by the Yoyo Endurance Test (YYET) results corresponds with existing evidence that training during the pre-competitive phase can significantly boost cardiovascular fitness [10]. Enhanced cardiovascular endurance is vital for athletes to maintain high-intensity efforts throughout competition.

The lack of significant change in BMI suggests that the training phase, while effective in improving fitness components, did not significantly alter body composition. This outcome is consistent with a study on Greek naval cadets showing that a weight training program significantly improved physical fitness components like push-ups, sit-ups, and strength, despite no significant BMI changes [11]. The stable BMI could also reflect the athletes' maintenance of a balanced diet tailored to support performance without substantial changes in weight.

IV. CONCLUSIONS

The study's findings reinforce the value of the pre-competitive phase in improving key physical fitness components, including muscular power, flexibility, muscular endurance, and cardiovascular endurance, among young athletes. These enhancements are crucial for preparing athletes to meet the demands of competition. However, the unchanged BMI suggests that while the training effectively enhanced specific fitness components, it did not significantly influence body composition. This highlights the need for a more integrated approach that could address both performance-related fitness and body composition, ensuring holistic physical development. Future research should continue to explore strategies for optimizing both fitness and health outcomes during critical training phases.

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Analyzing Mayweather's Boxing Dominance: Factors and Outcomes

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Abstract | This study delves into the critical performance indicators contributing to Floyd Mayweather Jr.'s dominance in professional boxing, encompassing punching techniques, accuracy, and defensive strategies across his 48 professional matches. Utilizing quantitative ex-post-facto design and observational analysis of video footage, the research employs NacSport for data collection and Jamovi for statistical analysis. Key performance indicators such as jabs, crosses, hooks, uppercuts, blocking, and dodging were meticulously examined to compare Mayweather's performance with that of his opponents. The results highlight Mayweather's superior defensive capabilities, with significant differences in the frequency and effectiveness of blocking and dodging compared to his opponents. Successful jabs (p = 0.002), crosses (p = 0.02), lead hooks (p = 0.004), rear hooks (p = 0.003), and uppercuts (p = 0.004) all demonstrate statistically significant differences in performance. Inferential statistics further underscore the disparities, with Mayweather consistently outperforming his opponents in both offensive and defensive actions. Specifically, blocking (p = 0.012) and dodging (p < 0.001) showed substantial deviations, reinforcing his tactical superiority. The discussion of these results reveals several key insights into Mayweather's boxing technique and strategic approach. Mayweather's high accuracy in landing jabs and crosses demonstrates his ability to deliver precise and effective punches, which is crucial for maintaining offensive pressure and scoring points. His proficiency with lead hooks, rear hooks, and uppercuts highlights his versatility in exploiting various openings in his opponent's defences. Defensively, Mayweather's substantial advantage in blocking and dodging actions underscores his exceptional ability to anticipate and neutralize his opponents' attacks. This minimizes the damage he sustains and creates counterpunching opportunities, further enhancing his offensive output. The conclusions emphasize the critical role of both offensive precision and defensive proficiency in boxing success. Mayweather's unmatched accuracy and defensive skills have been pivotal in maintaining his undefeated record.

Keywords: *Floyd Mayweather Jr, punching accuracy, defensive strategies, boxing performance indicator, total punch landed.*

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I. INTRODUCTION

In Floyd Mayweather Jr.'s boxing career, key performance indicators like punching accuracy, total punches landed, and defensive effectiveness were crucial to his success. This study analyzes these factors to understand their impact on Mayweather's matches. The present study was conducted to systematically describe the key indicators of punching techniques and defensive strategies that propelled Floyd Mayweather Jr. to his unprecedented undefeated streak in boxing and to simultaneously differentiate the key indicators such as punching techniques and defensive strategies that set him apart from his opponents and contributed to his success.

II. METHODS

This study uses a quantitative ex-post-facto design to analyze 48 Floyd Mayweather fights ($N = 48$). Notational analysis with Nacsport serves as the primary method of data collection, systematically recording in-ring actions like punches thrown and landed, as well as defensive techniques. The collected data is analyzed using Jamovi version 2.3.28.0, employing descriptive and inferential statistical techniques to examine Mayweather's punching accuracy and defensive effectiveness, offering insights into his dominance in boxing.

III. RESULTS AND DISCUSSION

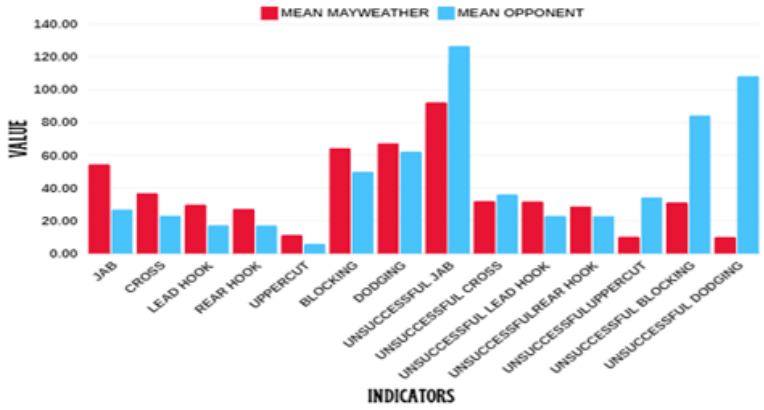

Fig.1 Descriptive table

Floyd Mayweather generally outperforms his opponents in several key boxing metrics. For jabs, Mayweather has a mean of 54.48, significantly higher than his opponents' average of 27.02. In crosses, Mayweather's mean is 36.94, compared to 23.06 for his opponents. Mayweather's performance in lead hooks is also superior, with a mean of 29.90, whereas his opponents average 17.44. Regarding rear hooks, Mayweather's mean stands at 27.38, surpassing his opponents' average of 17.35. His uppercuts average 11.40, notably higher than the opponents' 6.08. In defensive metrics, Mayweather's blocking average is 64.40, compared to 50.10 for his opponents, and his dodging average is 67.42, slightly above the opponents' 62.38.

In terms of unsuccessful attempts, Mayweather's mean for unsuccessful jabs is 92.29, whereas his opponents have a higher mean of 126.67. For unsuccessful crosses, Mayweather averages 32.02, compared to 36.16 for his opponents. Mayweather's unsuccessful uppercuts averaged 10.29, which is significantly lower than the opponents' 34.46. In unsuccessful blocking, Mayweather's mean is 31.25, markedly lower than the opponents' 84.40. Finally, Mayweather's mean for unsuccessful dodging is 10.29, contrasting with 108.31 for his opponents.

TABLE I
INFERENTIAL TABLE

Indicators	**Outcome**	**Statistic**	***df***	***p***
Jab	Successful	614.5	94.0	0.001*
	Unsuccessful	904.0	94.0	0.070
Cross	Successful	730.0	94.0	0.002*
	Unsuccessful	1083.5	94.0	0.618
Lead Hook	Successful	622.0	94.0	0.001*
	Unsuccessful	874.0	94.0	0.042*
Rear Hook	Successful	722.0	94.0	0.002*
	Unsuccessful	947.5	94.0	0.135
Uppercut	Successful	627.5	94.0	0.001*
	Unsuccessful	486.5	94.0	0.001*
Blocking	Successful	895.0	94.0	0.04*
	Unsuccessful	426.0	94.0	0.001*
Dodging	Successful	1057.5	94.0	0.03*
	Unsuccessful	98.0	94.0	0.001*

Table 1 presents the p-values for boxing statistics comparing Floyd Mayweather's successful and unsuccessful attempts against his opponents. Significant differences are observed in successful jabs ($p < 0.001$), successful crosses ($p = 0.002$), successful lead hooks ($p < 0.001$), and successful rear hooks ($p = 0.002$), successful uppercuts ($p < 0.001$), successful blocking ($p = 0.04$), and successful dodging ($p = 0.03$). For unsuccessful attempts, significant differences are noted in uppercuts ($p < 0.001$) and blocking ($p < 0.001$), as well as in dodging ($p < 0.001$) and lead hooks ($p = 0.042$).

Floyd Mayweather's superior use of jabs and crosses is a key factor in his boxing success. His exceptional precision and speed allow him to land a significant percentage of these punches, disrupting opponents' rhythm and strategy. Mayweather's frequent use of these punches, particularly in later rounds, accumulates physical and mental pressure on his opponents. This approach aligns with research indicating that accurate and frequent straight punches contribute to a higher likelihood of winning [3].

Mayweather's effectiveness with lead hooks, rear hooks, and uppercuts significantly outperforms his opponents. His precision with these punches exploits defensive openings and scores points effectively. Studies highlight the importance of punch accuracy in successful boxing, with Mayweather's higher accuracy rates in these categories reinforcing his technical prowess [2].

Mayweather's defensive skills, including blocking and dodging, are integral to his boxing success. His effective use of the shoulder roll, head movement, and distance control minimizes damage and creates

counter-attack opportunities. Research supports that elite defensive techniques and distance management contribute significantly to a boxer's success [1].

IV. CONCLUSIONS

Floyd Mayweather Jr.'s unparalleled success in professional boxing is attributed to his mastery of jabs and crosses, demonstrating dominance over his opponents. His exceptional punching accuracy exceeds that of his competitors, further bolstering his edge in matches. Mayweather's exceptional defensive abilities, including adept blocking and evasive maneuvers, consistently propel him to victory, underscoring his undefeated career.

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Assessing the Quality of Diet and Exercise Plans Generated by AI Chatbots: A Preliminary Study Using the NExGEN Prompt Generator System

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Abstract | Artificial intelligence (AI) chatbots like ChatGPT are increasingly used in obesity research to track diets, activity, and energy expenditure. However, its effectiveness in diet and exercise planning depends on the precision and completeness of user inputs. This study evaluates the quality of ChatGPT output when combined with the newly developed diet and exercise prompt generator system, NExGEN. A cohort of obese participants (n = 18) was enlisted to contribute interpersonal data for the NExGEN prompt generator. Utilising ChatGPT-4, this data informed the creation of 36he36ious36s36d weekly dietary and exercise plans. Accredited professionals (n = 16) conducted a blind evaluation of these plans by grading the quality and validity of the NExGEN-ChatGPT responses using the DISCERN and content validity index (CVI), respectively. The evaluators graded the NExGEN-ChatGPT responses as bottom tier 2.2% of the time, middle tier 16.3% of the time, and top tier 81.5% of the time. The CVIs score was ≥ 80% with a correlation coefficient between 0.89 – 0.99, and overall Cronbach's alpha score at 0.798. This study demonstrates that integrating ChatGPT with the NExGEN system effectively generates high-quality diet and exercise plans for obese individuals, as evidenced by favourable quality and validity assessments by professionals.

Keywords: *Artificial intelligence, obesity, physical activity, weight loss, weight management, nutrition.*

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I. Introduction

The release of ChatGPT, an artificial intelligence (AI) chatbot by OpenAI, has impacted both the public and healthcare professionals [1]. The chatbot's effectiveness depends on the precision of user prompts [2]. This study evaluated the quality of personalized diet and exercise plans generated through the combined use of ChatGPT and a novel prompt generator tool called NExGEN.

II. Methods

A cohort of 48 obese participants was recruited to evaluate the personalized exercise and dietary plans based on NExGEN and ChatGPT. Twelve accredited professionals in nutrition and exercise blindly assessed the plans using the DISCERN tool [3] to ensure an unbiased evaluation of the AI-generated plans.

III. Results and Discussion

In this study, the internal consistency of the DISCERN tool was satisfactory, with a Cronbach's α of 0.89. The inter-rater agreement for DISCERN items varied, ranging from $\kappa = 0.182$ for item 14 to $\kappa = 0.90$ for item 5. The index of agreement for the overall quality rating (item 16) was $\kappa = 0.71$. The intraclass correlation coefficient for total DISCERN scores was 0.89 ($p < 0.001$), indicating a high level of agreement. Higher agreement levels were observed for more objective items, such as "Is the information in the plan consistent with current knowledge in exercise and nutrition science?" (item 2, $\kappa = 0.83$) and "Is the plan updated to reflect current guidelines and recommendations?" (item 4, $\kappa = 0.84$), which aligns with previous research findings [4]. Conversely, lower agreement levels were noted for more subjective items, such as "Does the plan disclose any potential biases or conflicts of interest?" (item 8, $\kappa = 0.34$) and "Does the plan include clear markers for assessing progress?" (item 14, $\kappa = 0.18$) (see Table 1).

TABLE 1
SUMMARY OF AGREEMENT BETWEEN RATERS FOR EACH ITEM OF THE DISCERN

Item		Weighted K	95% CI	Level Of Agreement
1	Does the plan specify the sources of information used to create it?	0.398	(0.364, 0.432)	Fair
2	Is the information in the plan consistent with current knowledge in exercise and nutrition science?	0.827	(0.775, 0.882)	Almost Perfect
3	Does the plan provide both positive and negative aspects of the recommended regimen?	0.583	(0.547, 0.619)	Moderate
4	Is the plan updated to reflect current guidelines and recommendations?	0.841	(0.782, 0.884)	Almost Perfect
5	Does the plan consider the subject's personalized information?	0.902	(0.878, 0.926)	Almost Perfect
6	Is the plan comprehensive, covering all important aspects of exercise and nutrition?	0.775	(0.749, 0.801)	Substantial
7	Does the plan provide detailed and specific instructions for each recommended activity and meal plan?	0.738	(0.704, 0.772)	Substantial
8	Does the plan disclose any potential biases or conflicts of interest?	0.342	(0.308, 0.376)	Fair
9	Are the exercise and dietary goals realistically achievable for the given participant?	0.778	(0.729, 0.818)	Substantial
10	Is the plan tailored to the participant's specific needs and preferences?	0.799	(0.738, 0.845)	Substantial
11	Does the plan include instructions to avoid injuries and adverse health effects?	0.454	(0.420, 0.488)	Moderate
12	Is the information within the plan clearly presented and understandable, making it easy for someone to follow without additional explanations?	0.709	(0.675, 0.743)	Substantial
13	Is the plan viable in terms of resources (time, equipment, and food availability)?	0.452	(0.418, 0.486)	Moderate
14	Does the plan include clear markers for assessing progress?	0.182	(0.148, 0.216)	Slight
15	Does the plan include easy-to-understand guidance or annotations that help explain how to implement and follow the recommended routines effectively?	0.757	(0.703, 0.806)	Substantial
16	How would you rate the overall quality and reliability of this exercise and dietary plan?	0.708	(0.658, 0.763)	Substantial

*Level of agreement as indicated by Landis and Koch.

IV. CONCLUSIONS

This study is the first to evaluate the quality of information generated by combining a prompt generator (NExGEN) with ChatGPT for weight management in obese individuals. Using the DISCERN tool, the research demonstrated satisfactory internal consistency in the information generated by the NExGEN-ChatGPT framework. Inter-rater agreement varied across DISCERN items, with higher agreement for objective items such as consistency with current knowledge in exercise and nutrition science and inclusion of updated guidelines. Lower agreement was noted for subjective items like potential biases and progress markers. These findings highlight the potential of combining prompt generators like NExGEN with AI systems to produce high-quality health information while emphasizing the need for improvement in subjective evaluations. The study also revealed high overall quality ratings and a robust intraclass correlation coefficient, indicating reliable content. Further research is necessary to broaden the applicability of these findings across various populations and health contexts.

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Association Between Physical Activity and Sleep Duration Among Young Adults of UiTM Seremban 3

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Abstract | Sleep and physical activity have been shown to be correlated in research, but this association is only correlational and does not show relationships over time. This study aimed to investigate the correlation between physical activity and sleep duration. A total of 26 healthy young adults (age 21.0 ± 2.2 years) participated in this study. The amount of exercise and sleep duration were assessed using a uniaxial accelerometer. There was no significant correlation between total sleep time and calories burned (B = -0.312, p = 0.077), moderate to vigorous physical activity (B = -2.22, p = 0.087), while there is a significant correlation between total sleep time with steps count (B = -0.0267, p = 0.013). The results suggest that there is evidence that physical activity can help in promoting healthier sleep. Other factors that may influence sleep among young adults include diet, daily lifestyle, and sleep routine

Keywords: *Sleep duration, physical activity, accelerometer, young adults.*

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I. INTRODUCTION

Regular physical activity has been consistently linked to enhanced sleep quality and duration. While the precise relationship between the intensity and frequency of exercise and sleep is complex, moderate-intensity physical activity is generally associated with improved sleep outcomes. This is particularly relevant for young adults, who frequently experience sleep problems such as insomnia, sleep apnea, restless leg syndrome, and narcolepsy. These sleep disorders can disrupt sleep patterns and negatively impact overall health and well-being. By engaging in regular physical activity, individuals can potentially mitigate these issues and promote healthier sleep habits.

II. METHODS

Sample of students will be recruited via purposive sampling, aiming for a size that ensures statistical power, utilizing accelerometer to collect data on participants' physical activity levels and sleep duration. Instrumentation that is used is Actigraph GTX3+ as for the accelerometer. The accelerometer was worn by participants for a period of approximately seven days.

III. RESULTS AND DISCUSSION

Preliminary findings indicate a weak yet significant positive correlation between physical activity and sleep duration among the participants. This suggests that individuals who engage in higher levels of physical activity tend to experience longer sleep durations. However, the correlation was not strong enough to draw definitive conclusions, highlighting the need for further investigation. The more time one spends sleeping, the less time is available during the day to be physically active [1].

There is a negative relationship between steps and total sleep time, with individuals taking more steps having slightly less sleep time. This relationship is statistically significant with an R^2 value of 0.230. A negative correlation exists between calorie burn and sleep time, where higher calorie burn is associated with slightly less sleep. This correlation is marginally significant with an R^2 value of 0.125. Similarly, a negative correlation is found between MVPA and sleep time, with higher MVPA levels linked to slightly less sleep. The correlation is marginally significant with an R^2 value of 0.117.

TABLE I
REGRESSION RESULTS OF SLEEP DURATION AND PHYSICAL ACTIVITY

Dependent Variable	Independent Variable	*B*	*t*	*p*	Results
Total Sleep Time	Steps	-0.0267	-2.68	0.013	$R = 0.480$ $R^2 = 0.230$ $F = 7019$ $*p < 0.05$
	Calorie burn	-0.312	-1.85	0.077	$R = 0.353$ $R^2 = 0.125$ $F = 3.42$ $p > 0.05$
	MVPA	-2.22	-1.79	0.087	$R = 0.343$ $R^2 = 0.117$ $F = 3.19$ $p > 0.05$

$p < 0.05$

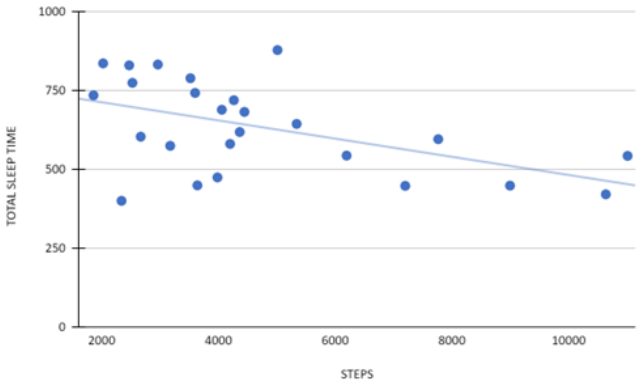

Fig. 1 Scatter plot graph for total sleep time towards steps count

The study findings show there is a positive correlation between physical activity and sleep duration. When total sleep time was longer than participants' average night, next day steps, calories burned, and minutes active were fewer [1]. The average amount of sleep among the subjects of the current study was 633 minutes (10.55 hours). An average of 7-8 hours a day is spent sleeping by adults, while teenagers spend an average of 11–12 hours per day sleeping [2]. That means most of the students in UITM Seremban 3 are sedentary.

IV. CONCLUSIONS

A study on young adults found a surprising link between physical activity and sleep duration. While more steps were associated with less sleep, this didn't significantly impact overall sleep quality. Calorie burn and intense exercise also had no effect on sleep duration. These results suggest a complex relationship between physical activity and sleep, though exercise remains beneficial for overall health.

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Comparative Analysis of Intermittent Exercise Training with and without Blood Flow Restriction on Physiological and Performance Matric

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Abstract | This study tested the hypothesis that intermittent exercise training (IET) combined with blood flow restriction (BFR) would improve muscle oxygen saturation (SmO2) and exercise performance. We investigated the effects of 6 weeks (3 days per week) of intermittent exercise training combined with BFR on the high-intensity intermittent exercise performance, SmO2, blood [glucose], and rating of discomfort. Following completion of a baseline Yo-Yo intermittent recovery level 1 test (Yo-Yo IR1), twenty-eight young men recreationally active in endurance-based sports were pair-matched and randomly assigned to the IET-BFR and IET-only groups. The IET-BFR group performed IET (50% of the maximum distance covered in Yo-Yo IR1 at baseline in 5 sets) with inflatable cuffs (1.3 × resting systolic blood pressure), and the IET-only group performed the same training without inflatable cuffs. Performance in the Yo-Yo IR1 was 8.3% greater ($p < 0.05$) with IET-BFR (1,444 ± 319 m) compared to IET-only (1,330 ± 362 m) after 18 training sessions. Additionally, the IET-BFR group exhibited significantly higher post-training SmO2% during the Yo-Yo IR1 test ($p < 0.05$). There were no significant differences between groups in blood [glucose] or rating of discomfort. These findings suggest that incorporating BFR into IET protocols could effectively enhance exercise performance, potentially attenuating the decline in local oxygen delivery.

Keywords: *Blood flow restriction, intermittent exercise, muscle oxygenation, exercise performance, endurance training.*

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I. Introduction

Recent studies have suggested that exercise training with blood flow restriction (BFR) may improve muscular strength and hypertrophy [1], but its combined effects with intermittent exercise training (IET) have not been examined [2]. This study examines the effects of a 6-week IET with and without BFR on performance, muscle oxygenation, blood glucose levels, and the rate of discomfort in recreationally active young men.

II. Methods

Twenty-eight young men (*mean* ± SD: age 21 ± 2 years, body mass 59 ± 9 kg, height 1.7 ± 0.09 cm) were divided into: IET-BFR (n = 14) and IET-only (n = 14). The IET-BFR trained with inflatable cuffs on their thighs (154 ± 6 mmHg), while the IET-only trained with minimal pressure cuffs. The training lasted 6 weeks, 3 days/week. Performance was measured using the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) [3], muscle oxygenation (SmO2) with the MOXY Muscle Oxygen Monitor [4], and blood glucose levels [5] and the rate of discomfort [6] were recorded.

III. Results and Discussion

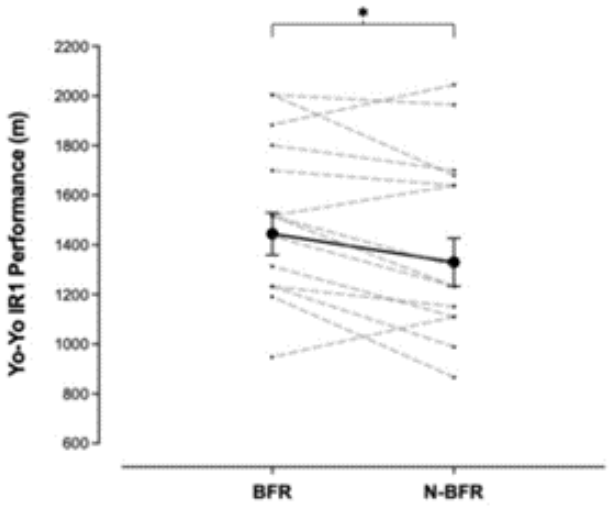

Fig. 1. The distance covered in the Yo-Yo IR1 between IET-BFR and IET-only post training (mean ± SEM and matched pair score).

The IET-BFR group showed an 8.3% improvement in Yo-Yo IR1 performance (1,444 ± 319 m) compared to the IET-only (1,330 ± 362 m, $p < 0.05$, Fig. 1). The SmO2 % was significantly higher ($p < 0.05$, Fig. 2) in the IET-BFR post-training. No significant differences were observed in blood glucose levels or the rate of discomfort.

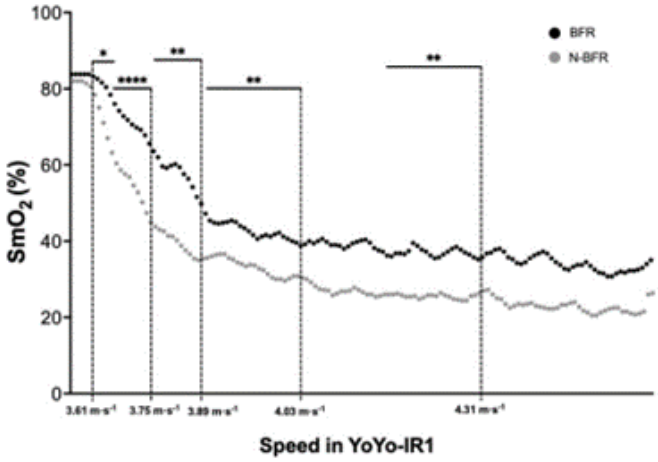

Fig. 2. Muscle oxygenation during Yo-Yo IR1 (*mean* ± *SEM*).

The results support the previous study by [7], demonstrating that incorporating BFR into IET significantly enhances performance and muscle oxygenation, without affecting blood glucose levels or discomfort. Additionally, this suggests BFR-IET as an effective training method for improving endurance in intermittent sports, consistent with previous findings by [8].

IV. CONCLUSIONS

IET-BFR improves performance, possibly by enhancing the muscle's ability to utilize oxygen more efficiently. Using BFR in intermittent sports (e.g., football, basketball, & rugby) training could enhance exercise performance and improve oxygen utilization, making it a useful technique for athletes to enhance their endurance and training efficiency.

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Comparison Between Individual and Team Sports in Physical Fitness During the Pre-Competition Phase

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Abstract | Periodization divides training into phases. The pre-competition phase focuses on sport-specific skills and intensity. This study compared individual and team sport athletes. Results showed no significant differences in body composition, flexibility, muscular power, or cardiovascular endurance. However, individual sport athletes had lower muscular endurance than team sport athletes. This suggests that training programs should be tailored to each sport's needs during the pre-competition phase. Further research is needed to understand factors and evaluate the effectiveness of tailored interventions. Data were analyzed using independent t-tests to compare the physical fitness variables between individual and team sports athletes. The independent t-test analysis revealed that there were no significant differences between individual and team sports athletes in body composition (BMI: individual sports = 21.17 ± 3.05, team sports = 21.39 ± 2.83, t (90) = -0.346, p = 0.730), flexibility (sit-and-reach test: individual sports = 37.48 ± 6.59cm, team sports = 39.61 ± 5.69cm, t (90) = -1.658, p = 0.101 muscular power (countermovement jump test: individual sports = 41.17 ± 11.16, team sports = 41.68 ± 13.85, t (90) = -0.195, p = 0.846), and cardiovascular endurance (yoyo endurance test: individual sports = 43.28 ± 7.89ml/kg/min, team sports = 40.33 ± 7.43ml/kg/min, t (90) = 1.846, p = 0.068). However, a highly significant difference was found in muscular endurance between the two groups during the pre-competition phase (1-minute push-up test: individual sports = 27.65 ± 12.24, team sports = 40.33 ± 7.43, t (90) = 4.357, $p < 0.01$). This study indicates that while body composition, flexibility, muscular power, and cardiovascular endurance do not significantly differ between individual and team sports athletes during the pre-competition phase, muscular endurance does show a marked difference. These findings suggest that training programs during the pre-competition phase may need to be tailored differently for individual and team sport athletes to address specific fitness components effectively. Future research should explore the underlying factors contributing to these differences and evaluate the long-term impacts of tailored training interventions on athletic performance.

Keywords: *Individual sports, team sports, physical fitness, pre-competition phase, periodization.*

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I. INTRODUCTION

In recent decades, performance monitoring has become an integral part of sports practice globally, providing essential insights for coaches and sports scientists to optimize athlete performance [1]. Performance monitoring plays a pivotal role in identifying athletes with potential, selecting individuals for elite teams, and predicting future performance [2]. The pre-competition phase is a critical period in an athlete's training cycle, where the focus shifts from general fitness to refining sport-specific skills and optimizing physical performance [3]. This phase is essential for both individual and team sports, although the physical and tactical demands differ significantly between these two types of sports. Research indicates that individual sports athletes tend to excel in specific physical fitness components like flexibility, upper body strength, leg power, and agility [4]. On the other hand, team sports athletes show variations in body composition, with differences in lean body mass composition noted between sport categories, while fat mass may not significantly differ among male athletes [5]. Given these differing demands, this study aims to compare the physical fitness components of athletes involved in individual versus team sports during the pre-competition phase. Understanding these differences is crucial for tailoring training programs that effectively prepare athletes for the specific challenges they will face in competition.

II. METHODS

A total of 92 SUKMA athletes were recruited for this study, consisting of 42 individual sports athletes (participating in tennis, karate, pencak silat, and muaythai) and 42 team sports athletes (participating in basketball, cricket, and volleyball). The participants underwent a series of physical fitness assessments, including body mass index (BMI), sit-and-reach test, Yoyo endurance test (YYET), countermovement jump test (CMJ), and one-minute push-up test. These assessments were conducted both before and after the athletes' preparatory phase to evaluate changes in BMI, flexibility, cardiovascular endurance, muscular power, and muscular endurance.

III. RESULTS AND DISCUSSION

Results in Table 1 revealed that there were no significant differences between individual and team sports athletes in body composition (BMI: individual sports = 21.17 ± 3.05, team sports = 21.39 ± 2.83), flexibility (sit-and-reach test: individual sports = 37.48 ± 6.59 cm, team sports = 39.61 ± 5.69 cm) muscular power (countermovement jump test: individual sports = 41.17 ± 11.16, team sports = 41.68 ± 13.85), and cardiovascular endurance (yoyo endurance test: individual sports = 43.28 ± 7.89 ml/kg/min, team sports = 40.33 ± 7.43 ml/kg/min). However, a highly significant difference was found in muscular endurance between the two groups during the pre-competition phase (1-minute push-up test: individual sports = 27.65 ± 12.24, team sports = 40.33 ± 7.43).

TABLE 1
COMPARISON BETWEEN INDIVIDUAL AND TEAM SPORTS IN PHYSICAL FITNESS

Variables	Statistic	*df*	*p*-value
Body Mass Index	-0.346	90.0	0.730
Flexibility	-1.658	90.0	0.101
Muscular Power	-0.195	90.0	0.846
Cardiovascular Endurance	1.846	90.0	0.068
Muscular Endurance	4.357	90.0	< 0.001

The results of this study provide important insights into the physical fitness differences between athletes involved in individual and team sports during the pre-competition phase. As shown in Table I, there were no significant differences between individual and team sports athletes in body composition (BMI), flexibility, muscular power, and cardiovascular endurance. The research findings from multiple studies provide insights into the comparison of body composition, flexibility, muscular power, and cardiovascular endurance between individual and team sports athletes. Studies [6] indicate that there were no significant differences in body composition metrics such as BMI between individual and team sports athletes. Additionally, researcher [4] highlight that various physical fitness parameters, including flexibility, muscular power, and cardiovascular endurance, did not significantly differ between these two groups. These results suggest that while there may be differences in specific body composition components like lean body mass, the overall physical fitness aspects analyzed across these sports categories show no significant disparities, emphasizing the importance of tailored training programs to meet the unique demands of individual and team sports.

However, a highly significant difference was observed in muscular endurance, with team sports athletes outperforming their individual sports counterparts in the one-minute push-up test. The research data from various studies indicates that there is a significant difference in muscular endurance between team sports athletes and individual sports athletes [4] [7]. Muscular endurance was found to be notably higher in team sports athletes compared to individual sports athletes, showcasing superior physical fitness levels in the former group. This difference in muscular endurance could be attributed to the specific training regimens and demands of team sports, which likely emphasize endurance and strength components to a greater extent. Additionally, the results suggest that team sports athletes tend to excel in various physical fitness parameters, highlighting the importance of considering the specific requirements of different sports disciplines when assessing athletes' performance levels [4] [7].

IV. Conclusions

In conclusion, the findings of this study reveal that while no significant differences exist in body composition, flexibility, muscular power, and cardiovascular endurance between individual and team sports athletes, a notable difference is present in muscular endurance, with team sports athletes demonstrating superior performance. This emphasizes the importance of sport-specific training, particularly in enhancing muscular endurance for team sports. Coaches and trainers should consider these differences when developing pre-competition training programs, ensuring that athletes are adequately prepared for the unique demands of their sport. Future research should explore the underlying factors contributing to these

differences and investigate how targeted training interventions might further improve performance in both individual and team sports contexts.

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Correlation Between Personality Traits and Goal Orientation Among E-Sport Players at UiTM Seremban 3

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Abstract | E-sports, a rapidly growing industry, requires a deep understanding of players' psychological profiles to enhance their performance and well-being. Competitive e-sport players at Universiti Teknologi MARA (UiTM) Seremban 3 face multifaceted challenges, including performance inconsistency, teamwork issues, stress management, motivation, and burnout. This study addresses these challenges by exploring the interplay between personality traits and goal orientation, aiming to understand how players' psychological profiles influence these problems. Utilizing the Big Five Inventory (BFI) to assess personality traits and the Task and Ego Orientation in Sports Questionnaire (TEOSQ) to evaluate goal orientation, the research involved 136 players and employed Pearson correlation analysis. Significant correlations were found: extraversion was strongly positively correlated with task orientation ($r = 0.655$, $p < 0.001$) and moderately with ego orientation ($r = 0.393$, $p < 0.001$); agreeableness showed a moderate positive correlation with task orientation ($r = 0.607$, $p < 0.001$) and a weaker correlation with ego orientation ($r = 0.404$, $p < 0.001$); conscientiousness correlated moderately with task orientation ($r = 0.553$, $p < 0.001$) and weakly with ego orientation ($r = 0.392$, $p < 0.001$); neuroticism was moderately correlated with task orientation ($r = 0.516$, $p < 0.001$) but weakly with ego orientation ($r = 0.217$, $p < 0.001$); and openness had a high correlation with task orientation ($r = 0.610$, $p < 0.001$) and moderate with ego orientation ($r = 0.445$, $p < 0.001$). These findings highlight the importance of understanding players' personalities to effectively address performance variability, improve teamwork, manage stress, and prevent burnout, offering insights for targeted interventions to enhance the e-sports experience and foster a resilient, competitive community at UiTM Seremban 3.

Keywords: *Big Five Inventory, Task and Ego Orientation in Sports Questionnaire.*

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I. INTRODUCTION

E-sports, a rapidly evolving and highly competitive industry, has gained immense popularity worldwide. In this dynamic landscape, the performance and behaviour of e-sports players are influenced by various psychological factors, making it crucial to explore the intricate interplay between individual differences and competitive drive [1]. E-sports is a platform for sports activities where participants train and develop their physical or mental skills through the use of information and communication technology [2]. Therefore, this study is centered on identifying the relationships between personality traits and goal-orientedness among players at UiTM Seremban 3 and offering valuable insights into how unique personality characteristics and motivations affect their performance in the world of e-sports.

Players high in openness are likely to embrace task-oriented goals, focusing on personal development, learning, and creative problem-solving within the game [3]. Research indicates that individuals with high openness are more likely to engage in complex tasks and seek out new strategies, enhancing their skill sets and adaptability [4]. In contrast, those lower in openness might prefer more traditional approaches and may exhibit more ego-oriented behaviors, focusing on established methods to achieve recognition [5]. Extraverted players might exhibit both task-oriented and ego-oriented behaviors. They often excel in team-based games due to their strong communication skills and ability to motivate and engage teammates [6]. However, their focus on social recognition and competition can also lead to a higher level of ego orientation, where they are driven by the desire to outperform others and achieve status [7]. The balance between task and ego orientation in extraverts can influence their adaptability and success in various e-sports contexts [8].

II. METHODS

The correlational research design was used to examine the relationship between two or more variables to determine if they are related and to what extent. Data were collected using the Big Five Inventory (BFI) and the Task and Ego Orientation in Sports Questionnaire. The research employs specific methods for data collection, such as surveys and questionnaires, to assess personality traits and goal orientation. The population under investigation comprises approximately 158 active E-sports players at Universiti Teknologi MARA (UiTM) Seremban 3, whose dynamic nature requires careful consideration in sampling. To ensure the findings are representative, the Krejcie and Morgan (1970) sampling table was utilized to determine the appropriate sample size, which was calculated to be 113 participants. This sample size facilitates a statistically significant analysis while accounting for potential dropout rates, ensuring that the results can be generalized to the broader population of e-sports players at UiTM Seremban 3 with a known margin of error and confidence level.

The study utilizes two primary instruments to assess personality traits and goal orientation: the Big Five Inventory (BFI) and the Task and Ego Orientation in Sports Questionnaire (TEOSQ). The BFI evaluates personality traits across five dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness. It comprises a total of 44 items, with a five-point Likert scale ranging from “strongly disagree” to “strongly agree.” This instrument is well-regarded for its robustness and reliability, with Cronbach’s alpha values indicating strong internal consistency for each trait dimension. The TEOSQ measures goal orientation in sports through 13 items, divided into two subscales: task orientation and ego orientation. It employs a similar five-point Likert scale to assess the participants’ focus on personal skill

development versus competitive superiority. The reliability of the TEOSQ has been established through prior research, with translated versions also showing acceptable consistency.

Data collected from the Google Forms questionnaires was analyzed using IBM SPSS software version 28.0. Descriptive statistics were first employed to summarize the basic features of the data and provide a clear overview of the E-sports players' personality traits and goal orientation. A correlation analysis was conducted to explore the relationships between personality traits and goal orientation, providing insights into how these factors interact and influence each other. These statistical methods collectively enable a comprehensive understanding of the psychological profiles of the e-sports players at UiTM Seremban 3.

III. RESULTS AND DISCUSSION

TABLE 1
RELATIONSHIP BETWEEN GOAL ORIENTATION AND PERSONALITY TRAITS

		Task	Ego
Extraversion	Pearson Correlation	0.655**	0.393**
	Significant (2-tailed)	< 0.001	< 0.001
Agreeableness	Pearson Correlation	0.607**	0.404**
	Significant (2-tailed)	< 0.001	< 0.001
Conscientiousness	Pearson Correlation	0.533**	0.392**
	Significant (2-tailed)	< 0.001	< 0.001
Neuroticism	Pearson Correlation	0.516**	0.271**
	Significant (2-tailed)	< 0.001	0.001
Openness	Pearson Correlation	0.610**	0.455**
	Significant (2-tailed)	< 0.001	< 0.001

The data reveals distinct relationships between personality traits and goal orientation. Extraversion is strongly correlated with task orientation ($r = 0.655$, $p < 0.001$), meaning outgoing individuals are highly focused on personal growth and skill development, and moderately correlated with ego orientation ($r = 0.393$, $p < 0.001$), indicating a lesser, but still present, focus on outperforming others. Agreeableness also shows a strong correlation with task orientation ($r = 0.607$, $p < 0.001$), suggesting that cooperative and friendly individuals prioritize their own improvement, and a moderate correlation with ego orientation ($r = 0.404$, $p < 0.001$), implying some competitive tendencies. Conscientiousness is positively correlated with both task orientation ($r = 0.533$, $p < 0.001$) and ego orientation ($r = 0.392$, $p < 0.001$), reflecting a focus on both personal achievement and competition. Neuroticism correlates moderately with task orientation ($r = 0.516$, $p < 0.001$) and weakly with ego orientation ($r = 0.271$, $p = 0.001$), indicating a greater focus on personal growth and a lesser emphasis on competition. Lastly, openness is strongly correlated with task orientation ($r = 0.610$, $p < 0.001$), reflecting a high focus on personal development, and moderately with ego orientation ($r = 0.455$, $p < 0.001$), showing some interest in being better than others.

The study on UiTM Seremban 3 e-sports players reveals that the predominant personality traits are openness and extraversion, with lower levels of neuroticism. Openness and extraversion correlate strongly

with task-oriented goals, reflecting players' focus on personal growth and skill mastery, while conscientiousness and agreeableness also support both task and ego orientations. Gender differences in personality traits were minimal, with both males and females displaying high levels of openness, agreeableness, and conscientiousness, though males showed a slightly higher ego orientation. Male and female players showed high levels of openness, which is crucial for adopting new strategies and enhancing game performance [9]. The study found no significant differences in ego goal orientation between genders, but males were slightly more ego-oriented than females. Personality traits such as extraversion and openness significantly relate to both task and ego orientations, indicating that players with these traits are likely to be both competitive and focused on personal development. These findings highlight the role of personality in shaping e-sports performance and suggest that understanding these traits can aid in designing effective training and team-building strategies. Correlation analysis also shows that there is a low-level relationship between the openness personality trait and a significant ego goal orientation [10].

IV. CONCLUSIONS

E-sports athletes shared many common characteristics, including a strong sense of focus, adaptability, strategic thinking, high levels of competition, and excellent teamwork. Male players frequently demonstrated higher levels of assertiveness and competition, whereas female players tended to combine mastery and performance goals with a stronger emphasis on teamwork. Overall, they displayed a blend of these orientations. The correlation between goal orientation and personality attributes indicated that players who were mastery-oriented prioritized skill development and personal improvement, while performance-oriented players tended to be more assertive and competitive. These results were consistent with the goal of the study, which was to maximize player performance through an understanding of and utilization of the interaction between goal orientation and personality factors.

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Determination of Social Media Usage on Mental Health Among FSR Students at UiTM Seremban 3

Samuel Millan Tommy, Aida Roha Abdul Rasid*, Radzliyana Radzuwan, and Mohd Shariman Shafie.

Abstract | This study aimed to investigate the determination of social media usage on mental health among FSR students at UiTM Seremban 3. A quantitative research design was applied which was a survey method by distributing a questionnaire via Google form to 349 FSR students at UiTM Seremban 3. Bergen Social Media Addiction Scale (BSMAS) was used to test the usage of social media among the students with 6 items. Depression, Anxiety and Stress Scale-21 (DASS-21) were used to test the level of mental health with 21 items. Descriptive analysis was used to determine the highest mental health factors involved among the students. SPSS software version 28.0 was used to analyze data of the result. The result showed that stress is the highest dimension under mental health with a mean score of (M = 2.12, SD = 0.786). The result showed that there was no significant difference (p-value = 0.480) between genders regarding mental health factors. Therefore, it failed to reject the null hypothesis. In addition, there was a significant relationship (p-value < 0.001) between social media usage and mental health with a moderate positive level of correlation (r = 0.450). The study's findings will provide a greater understanding.

Keywords: *Social media, mental health, depression, anxiety and stress.*

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I. INTRODUCTION

Nowadays, social media has a big influence on people's daily lives. Social media offers benefits including immediate information distribution, global connectivity, enhanced interpersonal communication, and business development through learning and discovery. It transforms interaction, connection, and self-development [1]. Additionally, the previous study stated that in January 2021, 86.0% of Malaysia's population was active on social media. An average of 181 minutes is spent on social media every day, and they spend time mostly on YouTube, Instagram, Facebook, and WhatsApp [4].

Social media platforms had become a vital part of the lives of Malaysian university students, bringing both benefits and threats. The widespread usage of social media had transformed communication and information sharing among Malaysian university students. Excessive use of social media platforms, on the other hand, can lead to addictive behaviours, significantly compromising students' academic performance, mental health, and social connections [9]. Thus, this study aimed to identify whether using social media can contribute to mental health problems.

According to the dual continuum model, mental health is made up of two linked but separate concepts, which are mental well-being and mental disease. Mental well-being may be defined as positive emotionality or aiming for optimal functioning as an individual, whereas mental disease refers to symptoms of mental illnesses. According to previous study, mental Health Promotion and Protection Model, a healthy mental state can operate as a protective factor for mental illness, whereas low mental health might be a risk factor for mental disease [5].

Moreover, there was a growing concern regarding whether social media use could worsen users' mental health, given the growth in adult and adolescent depression cases in Malaysia [4]. Between 2014 and 2015, Malaysian media and journals extensively covered the diverse array of mental health issues prevalent among adolescents. A total of 3,073 cases were identified, all associated with depression. The escalating incidence of depression among both Malaysian adults and children has raised apprehensions about the potential influence of social media on the mental well-being of its users. This escalating trend underscores the need for a closer examination of the interplay between social media and mental health in the Malaysian context. Thus, this study aims to examine whether there is any relationship between social media usage and mental health among students.

II. METHODS

A quantitative research design was used in this study by using the survey method. For this study, the population refers to UiTM Seremban 3 students who enrolled in the Faculty of Sports Science and Recreation. The Statistical Package for Social Science (SPSS) version 28 was used for analysing all the data. The questionnaire consisted of three sections. The first section was the demographic profile of respondents, followed by the Bergen Social Media Addiction Scale (BSMAS). Moreover, the next section was the Depression Anxiety and Stress Scale-21 (DASS-21). There were three factors or domains that were accessible in the questionnaire, which were depression, anxiety, and stress. In addition, the hypothesis was tested using Independent T-test and Pearson Correlation.

III. RESULTS AND DISCUSSION

A. Differences between Genders

The major purpose of this study was to find a comparison between two groups, which was male and female whether there's a difference between these two. The results of the Independent T-test comparing mental health scores between male (*N* = 179, *Mean* = 1.997, *SD* = 0.783) and female (*N* = 170, *Mean* = 2.063, *SD* = 0.753) respondents revealed a non-significant difference. Therefore, based on this analysis, we failed to reject the null hypothesis.

TABLE 1
INDEPENDENT T-TEST FOR GENDER ON MENTAL HEALTH

Variable	**Group**	***N***	**Mean (SD)**	***t***	***df***	***p* value**
Mental Health	Male	179	1.997 (.783)	-0.801	347	0.480
	Female	170	2.063 (.753)			

B. Relationship Between Social Media Usage and Mental Health

TABLE 2
PEARSON CORRELATION FOR SOCIAL MEDIA USAGE AND MENTAL HEALTH

Variables		**Social Media Usage**
Mental Health	Pearson Correlation	0.450**
	Significant (2-tailed)	< 0.001
	N	349
Depression	Pearson Correlation	0.416**
	Significant (2-tailed)	< 0.001
	N	349
Anxiety	Pearson Correlation	0.413**
	Significant (2-tailed)	< 0.001
	N	349
Stress	Pearson Correlation	0.471**
	Significant (2-tailed)	< 0.001
	N	349

Table 2 presents Pearson correlation coefficients between social media usage and various aspects of mental health, which are depression, anxiety, and stress. Each correlation coefficient was statistically significant with p-values less than 0.001, indicating a robust relationship between social media usage and mental health variables. Specifically, social media usage showed a positive correlation with depression (r = 0.416), anxiety (r = 0.413), stress (r = 0.471), and overall mental health (r = 0.450). This suggests that both moderately positive levels of social media usage were associated with depression, anxiety, stress, and poorer overall mental health. Therefore, based on this analysis, there appears to be a significant positive

relationship between social media usage and adverse mental health outcomes, highlighting the potential impact of social media on psychological well-being. Thus, the null hypothesis was rejected.

IV. CONCLUSIONS

In brief, a significant amount of study had been done on the nuanced relationship between social media and mental health among the students. These studies revealed significant fresh findings about the relationship between student emotional health and the digital environment. Through a comprehensive investigation of this relationship, researchers wanted to get insight into the specifics of how social media affects depression, anxiety, and stress to improve the mental health setting for all students. The study highlights that among students at UiTM Seremban 3, stress was the most prevalent mental health issue, followed by anxiety and then depression, with all three showing moderate levels of occurrence and response variability. The high Cronbach's alpha of 0.959 underscores the reliability of these measures. Thus, this present study stated that the findings of the Independent T-test showed that there were no significant gender disparities in mental health outcomes.

On the other hand, social media use and mental health problems had strong positive relationships, indicating that increased social media use was linked to higher levels of stress, anxiety, and depression. According to this study, gender did not have an impact on students' mental health, but social media use does. Future research can be expanded on this study's foundation by addressing these recommendations and providing more in-depth and nuanced insights into the complicated relationship between students' usage of social media and mental health, ultimately fostering a more informed and healthy population of students.

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Development of Upper Body Strength Training for Pencak Silat Athletes in the Adult Competition Category in Pre-Competition Phase

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Abstract | In pencak silat, upper body strength is very important to support the techniques performed, such as gripping, pulling, and counterattack techniques when we are knocked down by an opponent. So, a trainer must understand the training program that suits your needs. The aim of this development is to provide a variety of training tailored to the needs of Pencak silat athletes in the pre-competition phase. On this basis, researchers developed a strength training model based on the needs of the pencak silat sport by carrying out the Research and Development (R&D) method with an FGD (focus group discussion) approach with pencak silat experts and physical strength conditioning experts. The research was carried out in stages and resulted in 10 upper body strength training models in the pre-competition phase, namely (1) cobra push-up, (2) bench press, (3) barbell row, (4) bosu lateral step with battle rope, (5) one hand push combine, (6) multi planar pull with resistance band, (7) side pull with resistance band,(8) clean and press,(9) multi-directional pull for take down with resistance band,(10) from ground to up single hand pull push. This movement model has gone through expert testing and small and large group testing, so it is concluded that this product can be put into practice in training.

Keywords: *Pencak silat, strength, upper body.*

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I. INTRODUCTION

Currently, pencak silat is implementing the PERSILAT 2023 version 7 regulations, which have an impact on updates in terms of technique and match mechanics, so that training patterns must also adapt to the latest regulations. As a coach, they must open themselves to following the latest developments in the sports science they studied [1]. Responding to the 2023 PERSILAT regulations requires more muscle strength training than the previous regulations, especially for the upper muscles. In the PERSILAT rules manual, it is explained that there are locks, pulls, pushes, and holding parts of the opponent's body [2]. So upper body strength is very dominant to be trained in adjusting to regulations. As explained by Coach Indra Sukmawan, the national pencak silat trainer, "in this new regulation there must be modifications to the exercises to strengthen the upper body, namely: arm muscles, shoulder muscles and pelvic muscles" (Interview: 25, May 2023).

According to [3], in the sports training methodology book, it is stated that strength training can be done as follows. First, exercise using your own body weight. Second, using loads that are lifted, pulled, pushed, and pressed. Third, practice playing using tools with added weights. Fourth, practice using specific tools. An upper body exercise model that will be adapted to the arms, shoulders, and back. The upper body that will be trained is adjusted to the needs of the arm muscles (biceps and triceps), shoulders (deltoid), back (trapezius, latissimus dorsi), hips (abdominal external oblique), and front chest (pectoralis major). During competition, these muscles play a very important role in supporting the upper body.

Upper body strength exercises that will be developed include arms, shoulders, and back. As Coach Edi Suhartono said, the international pencak silat coach and the Indonesian national team coach said, in the latest regulations, upper body muscle strength is very necessary, because in the latest regulations there are pulling, takedown, holding, and other techniques, so upper body strength is added, especially arm" (Interview: May 25, 2023). By training upper body strength, the upper body becomes strong and explosive so that it can determine the quality of the athlete's performance [4]. In training upper body strength, trainers must understand the 3 muscle contractions that are the basis for training muscles, namely isometric, isokinetic, and isotonic, for maximum muscle performance. Isometric is a longitudinal muscle movement with a focus on certain parts of the muscle and looks static, Isotonic is a shortened muscle movement; and dynamic muscle movement, Isokinetic is a muscle movement that tenses quickly and regularly with weight pressure that is adjusted to muscle strength, this movement can increase athlete performance [5]. Therefore, we are developing upper body muscle strength training for adult pencak silat athletes in the competition category based on the PERSILAT 2023 version 7 regulations in the pre-competition phase. To provide insight to coaches and athletes to use as a reference for training.

II. METHODS

Research methods used to produce certain products, as well as test the effectiveness of these products. Research refers to a research and development (R&D) method that involves 10-steps, which include; (1) needs analysis; (2) product design; (3) expert evaluation; (4) small group trial; (5) product revision; (6) large group trial; (7) product revision; (8) trial usage; (9) product revisions; and (10) mass products.

This section describes the steps taken by the developer in creating the product. Of the ten development steps adopted by [6] and the 10 development research steps proposed by [7], researchers only

used 7- steps that were adapted to the characteristics to be studied, namely (1) needs analysis; (2) product design; (3) expert evaluation; (4) small group trials; (5) product revisions; (6) large group trials; and (7) final product; according to [6]. Each researcher can select and adjust each step that is appropriate for the researcher can select and adjust each step that is appropriate for the researcher based on the circumstances during the development process. Researchers can make variations or modifications in each step that has been considered.

A. Product Trial

This product trial is to obtain the final product, and to find out whether the product that has been developed can further increase the effectiveness and efficiency of the development that has been carried out. The trial design was divided into four stages, namely: (1) expert evaluation carried out by conducting discussions using an FGD (focus group discussion) approach; (2) small group trials carried out by carrying out 10 variations of training models developed by researchers and filling out questionnaires. / questionnaire; (3) large group trials carried out by carrying out 10 variations of training models developed by researchers and filling out questionnaires; (4) product revision, namely the results of large group trials, which are then analyzed as a reference for completing the final product development 10 upper body muscle strength training model for adult pencak silat athletes in the competition category based on PERSILAT 2023 version 7 regulations in the pre-competition phase.

B. Test Subject

The test subjects used in this development are as follows: (1) the needs analysis subject was carried out with 2 pencak silat experts and 1 physical expert, (2) the evaluation subject consisted of 2 pencak silat experts and 1 physical expert; and (3) the subject The small group trials were 5 fighters from the IPSI Kab team. Malang, and (4) large group trial subjects were 10 martial artists from the State University of Malang team.

C. Types of Development Research Data

The data obtained is qualitative and quantitative. Qualitative data was obtained from the results of expert reviews, namely, pencak silat experts and physicists. As well as the results of discussions and observations from small group tests and large group tests. The data collection method in this research uses an FGD (focus group discussion) approach. Which describes the results of interviews and discussions with pencak silat experts and physical experts. Meanwhile, the data obtained from expert reviews and field trials is in the form of quantitative data. Data collection instruments: In the data collection process, researchers use instruments including field conditions, namely small group trials and large group trial results. This research was conducted to produce an upper body strength training model in the pencak silat sport in the pre-competition phase that is adjusted to the requirements of the 2023 PERSILAT regulations, version 7.

III. RESULTS AND DISCUSSION

A. Result

As a result of observations and interviews conducted with pencak silat experts, physicists, and martial artists, the researchers concluded that variations in upper body weight training models are very necessary in the world of pencak silat, so that reducing the risk of injury and increasing upper body strength can be achieved. Due to this, training variations are needed so that the training model is more effective, not monotonous, and more varied. Based on the facts above, researchers developed 10 models of upper body muscle strength training for adult pencak silat athletes in the competition category based on the PERSILAT 2023 version 7 regulations in the pre-competition phase.

i. Product Development

Based on the results of data collection from trial activities for the development of 10 upper body strength training models for pencak silat athletes in the adult competition category according to the 2023 martial arts regulations version 7 in the pre-competition phase, which are packaged in training model videos. Data analysis of the needs and results of this training model is the result of joint discussions with 2 pencak silat experts and 1 physical expert. The results of small group trials were obtained from pencak silat athletes from Malang Regency, while large group trials were obtained from pencak silat athletes from Malang State University.

The pencak silat expert who has carried out the justification is, first, a certified national trainer who is also a former Indonesian athlete. Second, internationally certified coaches and coaches for the Indonesian national team at the 2018 Asian Games, through joint discussions. Data from expert evaluation of the development of 10 models of upper body strength training for pencak silat athletes in the adult competition category according to the 2023 martial arts regulations version 7 in the pre-competition phase, received suggestions and input; (1) The number of repetitions is adjusted to the athlete's ability; this is based on individual principles. (2) The video adds an explanation of what the pre-competition phase is, so that those who study the video understand the purpose of training.

The physical expert who has carried out the justification is an internationally certified physical conditioning expert trainer, through joint discussions with pencak silat experts. Data from expert evaluation of the development of 10 models of upper body strength training for pencak silat athletes in the adult competition category according to the 2023 martial arts regulations version 7 in the pre-competition phase, received suggestions and input; (1) The choice of training model must be adjusted to the needs of pencak silat techniques. (2) Given an understanding regarding the variations of exercises used that can be developed according to training needs and targets (3). For the number of repetitions and sets, information and understanding can be provided so that the trainer can change it according to needs.

With a Likert scale of 1-4, the validator score instrument consists of 10 questions for martial arts experts and 10 questions for physical experts. The results of the expert (validator) assessment regarding the training variation development product are described as follows. Based on the data obtained from the results of expert validation in tables 1.1 and 1.2 above, it explains that the assessment from pencak silat expert 1 regarding the development of upper body muscle strength training in adult pencak silat athletes in the competition category based on the PERSILAT 2023 version 7 regulations in the pre-competition phase received a percentage score 90%. Pencak silat expert 2 regarding the development of upper body muscle

strength training in adult pencak silat athletes in the competition category based on PERSILAT 2023 version 7 regulations in the pre-competition phase received a percentage score of 90%. Meanwhile, based on the results of Table 1.3, validation by physical experts regarding the development of upper body muscle strength training for adult pencak silat athletes in the competition category was based on PERSILAT 2023 version 7 regulations in the pre-competition phase regarding training models, and it was found that 95% were feasible. In this way, the development of upper body muscle strength training in adult pencak silat athletes in the competition category based on the PERSILAT 2023 version 7 regulations in the pre-competition phase can be categorized as valid and suitable for use as a form of training.

Based on the results of the small group trials carried out by 5 research subjects and 10 research subjects in the large group trials, they obtained a percentage of 90% in the small group trials and 91% in the large group trials related to research on the development of upper body muscle strength training in adult pencak silat athletes in the competition category based on PERSILAT 2023 version 7 regulations in the pre-competition phase. With a percentage of 91% in large group trials, it can be categorized as very good and suitable as a specific form of training to support the latest pencak silat techniques.

B. Discussion

Based on the results obtained from pencak silat experts and physical experts, as well as small group trials and large group trials, there are several parts of the product that need to be revised. This revision was carried out to optimize the results of developing an upper body strength training model for adult pencak silat athletes in the sparring category based on the 2023 martial arts regulations version 7 in the pre-competition phase. The revisions obtained for the first stage of expert evaluation are as follows: 1) Making slight changes to the previous title “development of an upper body strength training model for adult age sparring category pencak silat athletes based on the 2023 martial arts regulations” to the development of a body strength training model The top section for pencak silat athletes in the adult fighting category is based on the 2023 martial arts regulations version 7 in the pre-competition phase. 2) The choice of training model must be adjusted to the needs of the pencak silat technique, so variations in training can be added. 3) The duration of the video can be increased by providing an explanation regarding the training schedule. 4) The video adds an explanation of what the pre-competition phase is, so that those who study the video understand the purpose of training. 5) In level placement, this level division can be adjusted to the training target, such as: Level 1: training with static movements or isolation (focusing on certain muscle parts). Level 2: added dynamic movements (moves) to train balance. Level 3: This movement is more complex according to the movement requirements of the sport and has pure explosive power according to the movement of the sport.

From these 3 levels, there are 10 training models that have been designed as a result of discussions with experts. This makes it easier for coaches to choose training programs based on the athlete’s training needs. What is no less important is that the trainer must understand the 3 muscle contractions that are the basis for training muscles, namely, isometric, isokinetic, and isotonic, for maximum muscle performance. For maximum upper body muscle contraction, there are 2 things that must be trained, namely, horizontal push, vertical push, and horizontal pull, and vertical pull, must be balanced. Because the pulling movement is more dominant, horizontal and vertical pulls must be trained more dominantly. So, the coach must understand the program from general preparation, specifically to pre-competition. The results of the assessment can be explained in the following discussion.

i. Testing for pencak silat experts

The results of a questionnaire test with pencak silat experts regarding research into the development of an upper body strength training model for adult pencak silat athletes in the sparring category based on the 2023 martial arts regulations version 7 in the pre-competition phase both showed results of 90%, which means "very good" meaning suitable for use in exercise.

ii. Testing with physical experts

The results of a questionnaire test with media experts showed a feasibility level of 95%, which means that research into the development of an upper body strength training model for adult pencak silat athletes in the adult competition category based on the 2023 version 7 martial arts regulations in the pre-competition phase is "very good, meaning the training model can be applied.

iii. Test the product on a small scale

The results of the respondent's test regarding the research "development of an upper body strength training model for adult pencak silat athletes in the sparring category based on the 2023 martial arts regulations version 7 in the pre-competition phase" on 5 pencak silat athletes from Malang district showed a total percentage of 90% categorized as "very good" meaning it is worth testing at the next stage.

iv. Test products on a large scale

The test results of respondents regarding the research "Development of an upper body strength training model for adult pencak silat athletes in the sparring category based on the 2023 martial arts regulations version 7 in the pre-competition phase" on 10 Malang district pencak silat athletes showed a total percentage of 91% categorized as "very good" which can be interpreted as meaning that the product is "very suitable" to be used as a training model.

V. Research limitations

Research on the development of an upper body strength training model for adult pencak silat athletes in the sparring category based on the 2023 martial arts regulations version 7 in the pre-competition phase has three limitations, including; 1) Product trial samples are still limited, because the research was conducted during the event holiday break (post-event); 2) There has been no previous research that has developed variations of training models in the PERSILAT 2023 version 7 regulations; 3) limited time for trial samples due to the time the researcher has, which coincides with his duties as an athlete.

vi. Advantages of research

Research on the development of upper body strength training models for adult pencak silat athletes in the sparring category based on the 2023 martial arts regulations version 7 in the pre-competition phase has advantages such as opening new innovations that explain variations in training models to strengthen the upper body, helping athletes and coaches. Carry out specific exercises in the 2023 PERSILAT regulations version 7 because this is new research that develops variations in upper body training models.

IV. CONCLUSIONS

The need for strength training in pencak silat sports is changing. If previously the upper body was not too dominant to train compared to the lower body, now the two have become balanced. Then, in training the arm muscles, previously the push muscles were more dominant than the pull muscles; now the two must be balanced. This is due to a lot of muscle unpreparedness, which results in injury. So, in the latest regulations, upper body muscle strength is very necessary, because in the latest regulations there are pulling, takedown, holding, and other techniques, so upper body strength, especially the arms, is added.

ACKNOWLEDGMENTS Pencak silat is my proud sport as an Indonesian citizen, and I really like learning about pencak silat, especially in the field of performance sports. To support this, a scientific approach is very important. So, I am very interested in learning about sports science. This is what encouraged me to carry out research into the development of pencak silat training according to the 2023 PERSILAT regulations, version 7.

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Differences in Performance Indicators Between Winning and Losing Teams in the Malaysia Super League 2024

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Abstract | Match analysis in soccer involves the systematic study of various elements of a game to understand performance, strategy, and outcomes. It is a critical component for coaches, analysts, and teams aiming to enhance their performance and gain competitive advantages. However, there is no study that has been reported on Malaysia elite football players. Analyzing the differences in performance indicators between winning and losing teams in the Malaysia Super League can provide insights into what factors contribute to a team's success. Thus, the first aim of this study is to determine the key metrics for performance indicators that distinguish winning teams from losing and then to compare the differences between these teams in the Malaysia Super League season 2024. Data was be collected from one hundred and forty-three players (N = 143) in thirteen matches (N =13) using a camera (Video Cam 3). The video was transferred and analyzed using a match analysis system (LongoMatch). Performance indicators will be analyzed in ball possession, number of passes, number of shots and number of goals. The teams will be divided into three categories: Top Rank, Middle Rank and Bottom Ran. One-way ANOVA will be used to determine the differences in these three groups. It was expected that winning teams tend to have good scores in all key metrics that have been investigated. The findings in this study will provide valuable insight for coaches, players, and analysts by highlighting the critical areas of performance that can influence a team's chances of winning. At this point, it can be concluded teams can enhance their chances of winning by knowing the performance indicators that they should focus on. Further research could explore the impact of other variables such as player fatigue, psychological factors, and in-game decision-making on match outcomes.

Keywords: *Match analysis, soccer, elite athletes, performance indicator, Malaysia.*

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I. INTRODUCTION

Football, or soccer, is a highly complex sport incorporating interplay between physical and technical factors [1]. Most research has explored the physical, physiological, and technical requirements of match-play [2], but limited studies have integrated these facts of match-play to gain a more holistic understanding of football performance [3]. Performance analysis in football involves the systematic study of various elements of a game to understand performance, strategy, and outcomes [4]. It may provide significant details of football performance. For instance, the key performance indicators that can be identified to separate between winner and loser [5]. This understanding is crucial for coaches, players, and analysts to enhance performance and gain competitive advantages. The Malaysia Super League (MSL) is one of the most prestigious competitions of the men's top professional football division of the Malaysian football league system [6]. Knownly administered by the Malaysian Football League (MFL). The MSL is one of the most popular annual sports tournaments in Malaysia, and fans are interested in the games and the title winners. Nevertheless, with a history of 20 years of MSL, a lack of studies has been reported on Malaysian elite football players. Analyzing performance in the MSL may provide various important metrics and factors that contribute to a team's success or failure, such as ball possession, total of passes, successful passes, and number of shots [7]. Analyzing these metrics can provide insight into the factors that contribute to a team's success. The aim of this study is to determine the key metrics for performance indicators in soccer that distinguish winning teams from losing teams and to compare the differences between these teams in the Malaysia Super League season 2024.

II. METHODS

A total sample of one hundred and forty-three professional football players (N = 143) will be analysed in thirteen matches (N = 13) during the MSL 2024. The game format was based on Fédération Internationale de Football Association (FIFA) rules and regulations. The match consists of two halves, each 45 minutes long, with one half time break of 15 minutes. Each team was allowed to have five substitutions during the match-play. The game was scheduled for the weekend (between Friday and Sunday). The MSL played in a double round-robin format in which each team in the league played twice against every other club; one home match and an away match. The club that gained the highest point will be considered the champion of the league.

Data will be collected from the first round of MSL 2024. Matches will be recorded using a video camera and transferred to the Longomatch system to be analysed. LongoMatch is a video analysis software used to analyse key performance metrics in sports. This system operated and provided details about players on the field, such as ball possessions, number of passes, number of shots, and number of goals [8]. Only outfield players will be included in the analysis, with players excluded if they did not complete the whole match. The team will be grouped into three groups: top rank, middle rank, and bottom rank. These three groups will be compared in the performance metrics. All results were reported as mean ± standard deviation. Analysis of Variance (ANOVA) will be used to compare the means of each performance indicator between winning and losing teams. All statistical analyses were performed using SPSS software (version 21.0, SPSS Inc., Chicago, IL), with the level of significance set at $p \leq 0.05$.

III. RESULTS AND DISCUSSION

It is expected that the winning teams will have good scores in all the key metrics that have been investigated. For instance, the result for key metrics in performance indicators such as ball possessions within the winning team are expected to be high as to above 60%, which will be expected to influence the number of passes (high), number of shots (high) and number of goals (high) and the match outcomes (victory). Conversely, losing teams are expected to show a lower percentage of ball possession, which is below 40% and other key metrics in performance indicators which create differences between winning and losing teams. The aim of this study is to determine the key metrics for performance indicators in soccer that distinguish winning teams from losing teams and to compare the differences between these teams in the MSL season 2024. Comparing winning and losing may therefore result in potential meaningful information on MSL team performance profiles.

The findings In this study are expected to provide insights and information on how the selected performance indicators, such as ball possessions, number of passes, number of shots, and number of goals, could really influence match outcome and help to highlight the tactical advantages by focusing into these key metrics and executing effective strategies [9]. Understanding these differences between winning and losing teams could help to refine a team's overall performance and strategies for a better match outcome in the MSL. Improving a team's possession retention, for example, may result in a more planned and controlled game, which raises the possibility of scoring and lowers the chance of goals being conceded and influences overall team performance enhancement.

IV. CONCLUSION

At this point, it can be concluded that teams can enhance their chances of winning by knowing the performance indicators that they should focus on. Further research could explore the impact of other variables such as player fatigue, psychological factors, and in-game decision-making on match outcomes.

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Effect of Cold-Water Immersion and Proprioceptive Neuromuscular Facilitation (PNF) Stretching on Muscle Soreness Among Negeri Sembilan Junior League U19 Hockey Players

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Abstract | Muscle soreness is a common challenge faced by hockey players due to the high-intensity nature of the sport, which involves explosive movements, rapid direction changes, and physical contact. DOMS is an uncomfortable sensation, or the term used to describe the soreness, stiffness, tightness, swelling, and weakness of muscles, which is felt after performing a severe or unfamiliar exercise after 24 to 72 hours. Some studies suggested that cold water immersion could be an effective strategy for athletes to facilitate faster recovery, but further investigation is needed. Also, some studies have presented PNF stretching as a valuable opportunity to enhance recovery and reduce the impact of muscle soreness, but further research is required. The purpose of this study was to compare the effects of cold-water immersion and PNF stretching on reducing muscle soreness in Negeri Sembilan Junior League Hockey Players after a match. Ten participants underwent the CWI group and PNF stretching group. This study was a quasi-experimental design. The participants immersed their lower body for 15 minutes in cold water immersion (≤ 15 °C). For PNF stretching, starting with holding position for 10 seconds, the player pressed back against the trainer for 6 seconds. The trainer resists and keeps the leg in the same position. Finally, the player flexes his hip muscles as the trainer gently presses the leg as far as possible into the stretch. They are doing one repetition for each muscle. The participant's pain scale (PS), knee range of motion (ROM), and muscular power (PWR) were recorded at five-time frames before, immediately after the match, 24 hours, 48 hours, and 72 hours after treatment. The effects in muscle soreness scores between the two groups were analyzed using repeated measures ANOVA. The results indicated that both cold water immersion (CWI) and PNF stretching (PNF) had a significant effect on the pain scale (PS), knee range of motion (ROM), and muscular power (PWR) between five-time frames ($p < 0.05$). Therefore, there was a significant difference in effect between CWI and PNF stretching. It can be concluded that cold water immersion was the best treatment overall for hockey players to reduce soreness after a match or training.

Keywords: *Cold water immersion (CWI), PNF stretching (PNF), delay-onset muscle soreness (DOMS), pain scale (PS), range of motion (ROM), muscular power (PWR).*

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I. INTRODUCTION

Muscle soreness is a common challenge faced by hockey players due to the high-intensity nature of the sport, which involves explosive movements, rapid direction changes, and physical contact [1]. A person who experiences DOMS will experience illness and pain in the affected muscles, decrease in range of motion and loss of muscle strength [2]. DOMS also occurs when a person starts to increase exercise intensity. Typical symptoms of DOMS are muscular pain tenderness, muscle swelling, tightness and soreness [2]. Delayed-onset muscle soreness sometimes requires a week or at least three days to recover. Popular methods being used to get fast recovery are active recovery, massage, contrast hot and cold-water treatment, ice bath, and recently roller massage [3]. Other methods that can be used to prevent and treat DOM include stretching. This method aims to minimize DOM, reduce DOM time, speed up ROM recovery and improve muscle function [2]. Stretching exercises contribute to enhancing joint range of motion and flexibility, which are essential for various physical activities and overall well-being [4]. Additionally, consistent stretching exercises have been associated with reduced muscle soreness post-exercise and improved muscular coordination, both vital for athletes and individuals engaged in regular physical activity [4].

Cold-water immersion or ice therapy is defined as a therapeutic application of cold or ice to treat injuries or manage muscle soreness that results in a decrease in tissue temperature. Cold water immersion (CWI) is a popular recovery technique involving the immersion of the body in cold water or ice baths following intense physical activity. This method is widely used in sports and exercise contexts to reduce muscle soreness, inflammation, and perceived fatigue, as well as to promote recovery. It also involves using cold therapy to help reduce pain and swelling in the body. The study suggested that cold water immersion could be an effective strategy for athletes to facilitate faster recovery between training sessions or 3 competitions [5]. Proprioceptive Neuromuscular Facilitation (PNF) stretching is a technique used to increase flexibility and improve range of motion. It involves a combination of stretching and 2 contracting muscles. Typically, PNF stretching includes techniques like hold-relax and contract-relax, where muscles are stretched, then contracted isometrically against resistance, and then stretched further in the relaxed state. PNF stretching techniques often include partner assisted stretching, where one person provides resistance while the other stretches. This approach is widely utilized in rehabilitation and sports training due to its effectiveness in improving range of motion and muscle performance. Many therapists use PNF stretching to help people regain their range of motion after injury or surgery. PNF stretching stands as a valuable technique in the realms of rehabilitation, athletic training, and overall physical wellness.

II. METHODS

A. Subjects

The participants in this study were hockey players from Negeri Sembilan Junior League U19. Twenty male hockey players were randomly selected for either the cold-water immersion group ($N = 10$) or the PNF stretching group ($N = 10$). A consent form must be provided for each, and every instrument used in the study to guarantee that the participant voluntarily agreed to participate in the study. The criteria for subject inclusion were (1) Participants must be male hockey players from Negeri Sembilan Junior League with age below 19 years old, (2) Participants must play for more than 30 minutes, (3) Participants must be

physically healthy and free from injuries, (4) Participants must have no history of metabolic, cardiovascular or pulmonary diseases.

B. Instrumentation

i. Range of Motion

The researcher uses a goniometer, a device that measures joint angles. AROM will be measured by the participant bending their knee as far as possible, bringing their heel towards their buttocks, while keeping their hips neutral and not lifting off the surface. Then, the researcher will take measurements before the match, immediately after the match, 24, 48, and 72 hours after the treatment. The range of motion was measured at the knee, as that area is commonly affected by exercise induced muscle soreness. The researcher will record these measurements using an individual data form. Normal knee flexion typically ranges from 0 to 135-150 degrees [6].

ii. Pain scale

The participants were asked to rate their pain intensity at rest and during movement on a scale from 0 to 10. The participants measured their perception of pain by using the visual analogue scale, which is characterized by a 10-cm horizontal scale in which 0 = no pain, 1 to 3 = mild, 4 to 6 = moderate to severe, 7 to 9 = very severe and 9 to 10 = worst pain possible. The VAS was administered to the participants before the match, immediately after the match, 24 hours, 48 hours, and 72 hours after the treatment. The VAS scores were used to assess the effect of the interventions on pain intensity in the hockey players [7].

iii. Muscular power

To measure muscular power in this study, the researchers used The Vertical Jump Test. This test was a common method used to measure an individual's ability to generate force and power with their lower body muscle. The vertical jump test is 21 typically performed by having the individual stand next to a wall or a measuring device and reach up as high as possible. The difference in height between the individual's reach and the highest point of their jump is measured and recorded as their vertical jump height. The athlete repeated this process three times, and the average or best of the three jumps was calculated. This method allowed for more accurate and reliable measurements of the athlete's muscular power [8].

C. Procedure

The participants were involved in light training 1 day before a hockey match. 30 minutes of exercise can indeed induce muscle soreness in many individuals. DOMS is a natural part of the muscle repair and adaptation process, but it can be managed through strategies like gradual progression, proper warm-up and cool-down and recovery techniques such as foam rolling, sport massage, cold water immersion and PNF stretching [9]. The participants played 60 minutes of a competitive hockey match. Using a pain scale, knee range of motion, and muscular power, the researcher assessed the muscle soreness and muscle power of the participants following the match. After assessing the markers of exercise-induced muscle soreness, they undertook two recovery interventions, which are CWI and PNF stretching. The intervention was conducted on separate days, with one match and one intervention only. The participants undertook another intervention after the next match. The CWI intervention was conducted in a folding pool filled with ice and water at a

temperature of 15°C. The participants were instructed to immerse their entire body in the water for 15 minutes [10]. Then, for the PNF stretching intervention, the participant holds the holding position for 10 seconds and then contracts, which is pressed back against the researcher for 6 seconds. The researcher then resists and keeps the leg in the same position. Finally, the participant flexes his hip muscles as the researcher gently presses the leg as far as possible into the stretch. The researcher would raise the participant's leg until the participant felt a stretch 22 [11]. The researcher then assessed the pain scale, knee range of motion and muscular power before the match, immediately after the match, 24 hours, 48 hours, and 72 hours after the treatment. The researcher compared the results between the CWI and PNF stretching to understand its effectiveness as a recovery strategy for reducing muscle soreness.

D. Statistical Analysis

The researcher used a randomized controlled trial design to compare the effect of cold-water immersion (CWI) and PNF stretching on markers of exercise-induced muscle soreness among Negeri Sembilan Junior League U-19 Hockey Players. Data were collected using the Visual Analogue Scale (VAS) to measure pain scale, a goniometer to measure knee range of motion on knee flexion, and a vertical jump to measure muscular power. Before analyzing the data, the researcher checked for any missing or inconsistent values and performed basic cleaning procedures. The researcher then used JAMOVI 2.3.28, a statistical software, to perform statistical tests to compare the mean pain scores, knee range of motion and muscular power measurements between the cold-water immersion and PNF stretching groups. Then, the researcher used repeated measures ANOVA to compare the mean pain scores at each time point. The researcher chose those statistical tests because they were appropriate for comparing means between two independent groups and for analyzing repeated measures data. The researcher believed that those tests would provide accurate and reliable results and would allow to draw conclusions about the effectiveness of cold-water immersion and PNF stretching on reducing muscle soreness among Negeri Sembilan Junior League U-19 Hockey Players.

III. RESULTS AND DISCUSSION

All the results showed that there was a significant effect of cold-water immersion group and PNF stretching group for all the biomarkers, which is range of motion (ROM), pain scale (PS) and muscular power (PWR) between the five-time series. Table 1 showed that the main effect of pain scale, active range of motion of left and right knee and muscular power was significant with the value was 0.001. This proposes that there was a change in all the biomarkers between the treatments across the five-time series.

TABLE 1
MAIN EFFECT OF PAIN SCALE

Effect	*p*	Eta Square
PS	< 0.001	0.874
AROML	< 0.001	0.727
AROMR	< 0.001	0.829
PWR	< 0.001	0.444

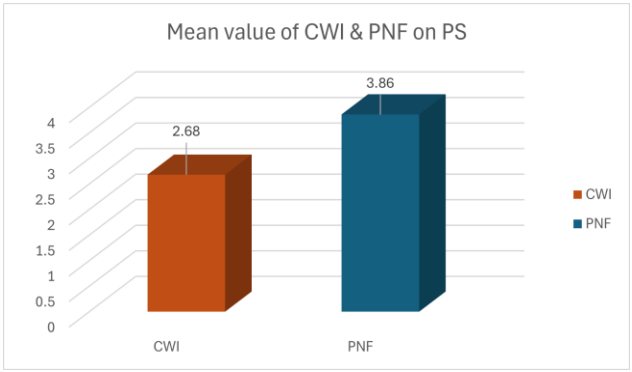

Fig. 1 Mean value of CWI and PNF on pain scale (PS)

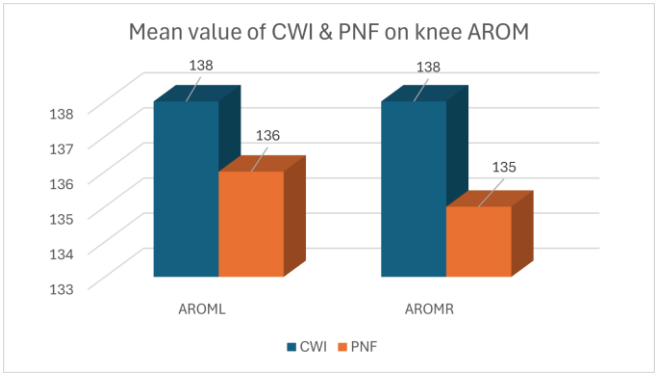

Fig. 2 Mean value of CWI and PNF on AROML and AROMR

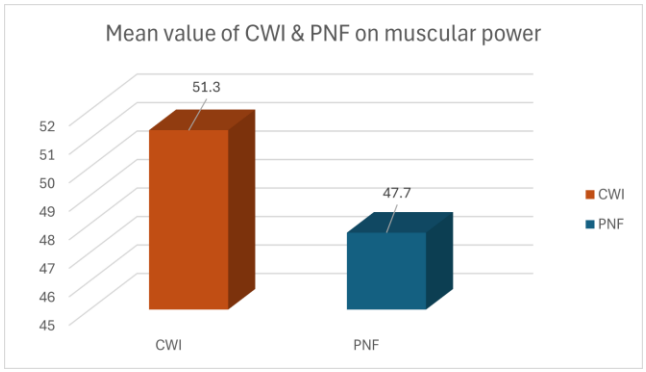

Fig. 3 Mean value of CWI and PNF on Muscular Power

Figure 1 shows each treatment has changes, which were a decrease for a five-time series. From the mean (M) value, it showed that the cold-water immersion (CWI) group had the lowest value for PS, which was 2.68, while the PNFF group had a value of 3.86, respectively. Figure 2 demonstrates each treatment change, which was an increment of both knee AROM for a five-time period. From the mean (M) value, it showed that the CWI group has the highest value for AROML and AROMR, which are both 138, compared to PNF, which has a value of 136 for AROML and 135 for AROMR. Figure 3 presents the mean value of muscular power (PWR) between CWI and PNF. According to the data, it showed that CWI group has the highest value, which is 51.3, compared to PNF group, which has a value of 47.7. Based on the current study, it showed that there was a significant effect on both treatment in terms of pain scale, active knee range of motion and muscular power. However, the result also showed that there is a significant difference effect for both treatments. It can be concluded that cold water immersion was the best treatment overall for the hockey players to reduce soreness after a match.

The purpose of this study was to compare the effects of cold-water immersion and PNF stretching on reducing muscle soreness in Negeri Sembilan Junior League Hockey Players after a match. Usually, cold water immersion and PNF stretching treatments are used to enhance the recovery of the hockey players. These treatments have had effects on three biomarkers in the body, which are the pain scale (PS), knee range of motion (ROM), and muscular power (PWR). These treatments gave a decrease in terms of PS and an increase in terms of ROM and PWR, which was based on the recovery time of the player.

Based on the result, CWI found to be more effective in reducing pain. Cold water immersion (CWI) can help relieve symptoms of delayed onset muscle soreness (DOMS) [12]. They found that applying CWI reduced pain sensations on the second and third days after measurement. This demonstrates that CWI treatments effectively minimize pain. Furthermore, this current study showed that range of motion and muscular power seem to have increased in the CWI group. CWI protocols, especially at temperatures between 10-15°C for durations of 10 minutes or more, were effective in enhancing ROM due to the decreased inflammation and muscle stiffness [8]. Also, cold water immersion (CWI) impaired muscle protein synthesis, it also highlighted its role in reducing acute muscle damage and soreness, aiding in faster recovery and improved performance in subsequent sessions [13].

In addition, this treatment reduced muscle injuries caused by muscle stretch or strain and reduced delayed onset muscle soreness (DOMS) that commonly happens after strenuous exercise, match or repetitive match. Based on the study, it showed that there was a significant effect on both treatments in terms of pain scale, active knee range of motion and muscular power.

IV. CONCLUSIONS

It can be concluded that cold water immersion was the best treatment overall for the hockey players to reduce soreness after a match. Overall results for the hypothesis were rejected because there was a significant effect of cold-water immersion and PNF stretching on pain scale, active knee range of motion and muscular power among hockey players. This indicated that the null hypothesis for a significant effect of cold-water immersion and PNF stretching on the pain scale, active knee range of motion, and muscular power was rejected. However, the null hypothesis for a significant difference effect of cold-water immersion and PNF stretching on the pain scale, active knee range of motion, and muscular power was rejected because there was a significant difference effect. Therefore, this current study can be applied to the entire athlete to promote effective recovery from repetitive or continuous matches.

ACKNOWLEDGMENTS We would like to express our sincere gratitude to all members of the research team for their invaluable contributions to this study. Your dedication, expertise, and collaborative spirit were instrumental in the successful completion of this research. We would also like to acknowledge the participation of all individuals who contributed their time and data to this study. Your support is greatly appreciated. Finally, we would like to thank the editors and reviewers of Exercise Science, Sport Management, Outdoor Recreation, and Physical Education (ExSPORT) 2024 for their insightful comments and suggestions, which significantly improved the quality of this paper.

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Effect of Physical Activity on Cognitive Function and Sleep Quality Among UiTM Seremban 3 Students

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Abstract | In the demanding landscape of university life, where sleep deprivation and mental exhaustion are commonplace, this study explores whether physical activity could be a game-changer for students, enhancing both academic success and overall well-being. Could physical activity be key to unlocking more significant cognitive potential and ensuring restorative sleep? Purpose: Although exercise and sleep quality are associated with cognitive function, their beneficial effects on cognitive function remain unclear. This study examines the impact of physical activity on sleep quality and cognitive function. Methods: 26 healthy young adults (age 22.3 ± 1.04 years) participated in this study. The Exercise amount was assessed using a uniaxial accelerometer. This study evaluated physical activity and sleep quality by actigraphy. Cognitive function was tested using the N-back task and the Wisconsin Card Sorting Test (WCST).Results: There were no significant associations between physical activity and sleep quality (B = -2.63e-4, p = 0.616), Nback task performance (B = -2.84e-4, p = 0.670), or WCST performance (B = -2.61e-5, p = 0.679), while sleep quality was significantly associated with N-back task performance (B = 0.540, p = 0.030) but not WCST performance (B = 0.0401, p = 0.097). Conclusion: Physical activity was not significantly associated with sleep quality or cognitive function. However, sleep quality was positively associated with working memory performance, suggesting that better sleep quality may enhance cognitive abilities in specific domains.

Keywords: *Physical activity, cognitive function, sleep quality, students, accelerometer, university students.*

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I. INTRODUCTION

A. Physical Activity

Regular physical activity can reduce the risk of chronic diseases such as heart disease, stroke, type 2 diabetes, and some types of cancer [1].

B. Cognitive Function

Individuals with strong cognitive function are less likely to experience depression, anxiety, and other mental health disorders [2].

C. Sleep Quality

Quality sleep strengthens the immune system, enhancing the body's ability to fight off infections and diseases [3].

II. METHODS

26 healthy young adults (age 22.3 ± 1.04 years) participated in this study. The Exercise amount was assessed using a uniaxial accelerometer. This study evaluated physical activity and sleep quality by actigraphy. Cognitive function was tested using the N-back task and the Wisconsin Card Sorting Test (WCST).

III. RESULTS AND DISCUSSION

A. Results

There were no significant associations between physical activity and sleep quality (B = -2.63e-4, p = 0.616), N-back task performance (B = -2.84e-4, p = 0.670), or WCST performance (B = -2.61e-5, p = 0.679), while sleep quality was significantly associated with N-back task performance (B = 0.540, p = 0.030) but not WCST performance (B = 0.0401, p = 0.097).

i. Association of Physical Activity with Sleep Quality

This could be due to the small number of students studied, other factors affecting sleep (like stress), or the fact that students who take breaks might sleep better even if they don't exercise much [4]. The relationship between exercise and sleep might also be more complex than just "more exercise equals better sleep" [5].

ii. Association of Physical Activity with Cognitive Function

This lack of a clear link has been seen in some other research too [6], even though some studies have found a positive effect of exercise on thinking [7] [8]. The study suggests a few reasons for this: the small sample size, the specific cognitive tests used, and not considering individual differences in fitness or exercise habits. It also proposes that even though students might not exercise a lot, the demands of university life, like organizing their time and giving presentations, could help them develop their working memory and executive function skills [9].

iii. Association of Sleep Quality and Cognitive Function

These findings support the idea that good sleep is important for working memory, which is a key skill for students [10]. This agrees with other research showing that poor sleep can harm working memory [11] [12]. The weaker link between sleep and executive function might still be important, and future studies with more participants could help clarify this relationship [13].

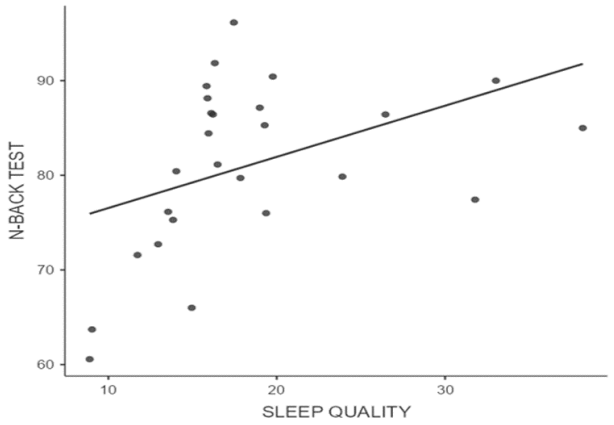

Fig. 1 Simple linear regression of each of the variables

IV. CONCLUSIONS

The study's findings suggest that among university students, sleep quality, particularly its impact on working memory, plays a more significant role in cognitive function than physical activity levels. The research emphasizes the importance of prioritizing healthy sleep habits for students to achieve optimal academic performance and overall well-being.

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Effect of Proprioceptive Neuromuscular Facilitation (PNF) and Sport Massage on Muscle Soreness Among Negeri Sembilan U-19 Junior League Hockey Players

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Abstract | Muscle soreness is a frequent issue for hockey players due to the sport's high intensity, involving explosive movements, quick direction changes, and physical contact. Delayed Onset Muscle Soreness (DOMS) refers to the discomfort characterized by soreness, stiffness, tightness, swelling, and muscle weakness experienced 24 to 72 hours after engaging in intense or unfamiliar exercise. Previous studies have suggested that PNF stretching might be an effective strategy for athletes to accelerate recovery, but further research is necessary. Similarly, research has indicated that sports massage could enhance recovery and lessen muscle soreness, though additional studies are required. The purpose of this study was to compare the effects of PNF stretching and sports massage in alleviating muscle soreness among Negeri Sembilan junior league hockey players after a match. There were 10 participants exposed to the PNF stretching group and sports massage group. This study was a quasi-experimental design. For PNF stretching, participants started by holding the position for 10 seconds, and the player pressed back against the trainer for 6 seconds. The trainer resisted and kept the leg in the same position. Finally, the player engaged his hip muscles while the trainer carefully pushed the leg to its maximum stretch. They performed one repetition for each muscle. For sports massage, a certified sports therapist administered 20-minute treatments using hypoallergenic oil, massaging each muscle group for 2.5 minutes with effleurage, petrissage, and tapotement, including cupping, hacking, and knuckling. The participant's pain scale (PS), knee range of motion (ROM), and muscular power (PWR) were recorded at five different time points: before the match, immediately after the match, and 24-, 48-, and 72-hours post-treatment. The differences in muscle soreness scores between the two groups were analyzed using repeated measures ANOVA. The results indicated that both proprioceptive neuromuscular facilitation stretching (PNF) and sports massage had a significant effect on the pain scale (PS), knee range of motion (ROM), and muscular power (PWR) between five time frames ($p < 0.05$). Therefore, there was a significant difference in the effect of PNF stretching and sports massage. It can be concluded that PNF stretching was the best treatment overall for hockey players to reduce soreness after a match or training.

Keywords: *Technical characteristics, men's singles badminton, comparative analysis, notational analysis, performance strategies.*

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I. Introduction

Delayed Onset Muscle Soreness (DOMS) includes soreness, stiffness, tenderness, swelling, and muscle weakening, appearing around 8 hours post-exercise, peaking at 24 to 48 hours, and gradually subsiding. While the exact cause is unclear, possible factors include connective tissue injury, metabolic waste buildup, and muscular spasm [1]. DOMS can significantly impair functional status, often requiring physical therapy. Various treatments, such as medications, herbal remedies, massage, and hot/cold packs, have been suggested, though their effectiveness is uncertain. Recent studies have explored eccentric workouts and non-traditional cryotherapy for treating DOMS [1]. Therapeutic techniques for DOMS include warming up, stretching, massage, acupuncture, and medication therapy. PNF stretching has been shown to reduce pain and improve functionality in exercise-induced muscle damage (EIMD) patients, especially when combined with plyometric training [2]. PNF, a rehabilitation method, enhances muscle recovery through contraction and relaxation techniques and is crucial for improving performance in competitive sports [3]. Understanding and managing muscle soreness is vital for athletes, including hockey players, as it can hinder performance and recovery. This research explored the impact of PNF and sports massage on muscle soreness among Negeri Sembilan junior league U19 hockey players. Sports massage, recognized for improving performance, preventing injury, and speeding recovery, manipulates soft tissues to reduce pain, improve circulation, and enhance muscle function [4]. Studies have shown sports massage reduces muscle soreness and improves recovery [5] [6]. It also enhances mood and well-being [7] and aids in muscle recovery while lowering inflammatory markers [8]. Effective management of muscle soreness in hockey players is crucial for performance, injury prevention, training continuity, mental well-being, and long-term health. By investigating PNF and sports massage, this study aimed to enhance the well-being and performance of these athletes.

II. Methods

The study used a quasi-experimental design to assess the effects of proprioceptive neuromuscular facilitation (PNF) stretching and sports massage on muscle soreness. This design helped establish causal links between the interventions and muscle soreness. Data were collected at five time points: before, immediately after, and 24-, 48-, and 72-hours post-competition. Participants were selected from the Negeri Sembilan junior league U19 hockey team using purposive sampling, focusing on those experiencing DOMS. The required sample size was calculated using G*Power, resulting in 10 participants with a 20% dropout rate, leading to 11 participants. Ten highly trained hockey players from Negeri Sembilan were recruited.

PNF Stretching: This study used the contract-relax method of PNF stretching. The athlete held a position for 10 seconds, then pressed back against the trainer for 6 seconds while the trainer resisted [19]. The trainer then pushed the leg into a maximum stretch [9]. This method targeted the quads, hamstrings, glutes, hips, and calves with one repetition per muscle.

Sports Massage: A 30-minute lower body sports massage was used to speed up recovery. Athletes lay face down for assessment and massage. A level 1 certified sports therapist administered a 20-minute massage using water-soluble hypoallergenic oil. Each muscle group (quadriceps, hamstrings, and calves) received 2.5 minutes of massage: 1 minute of effleurage (120 strokes/min), 45 seconds of petrissage (120

strokes/min), and 45 seconds of tapotement (240 contacts/min). Tapotement included 15 seconds each of cupping, hacking, and knuckling [10].

Pain Scale – Visual Analogue Scale: Participants assessed their pain levels on a 0-10 scale, with 0 indicating no pain, 1-5 indicating moderate pain, and 6-10 indicating severe pain. The visual analogue scale (VAS) featured a 10-cm horizontal line to quantify pain perception. Participants rated their pain at rest and during movement before and after the intervention, immediately after the match, and at 24-, 48-, and 72-hours post-treatment to evaluate the impact of therapies on discomfort [11].

Range of Motion—Goniometer: Active range of motion (AROM) was measured using a goniometer, which consists of a protractor attached to two perpendicular arms. The device was calibrated before each use to ensure accuracy. The knee's range of motion, commonly affected by exercise-induced muscle soreness, was measured before the match, after the match, 24-, 48-, and 72-hours post-treatment. Measurements were recorded on a standardized form [12].

Muscular Power–Vertical Jump: The vertical jump test used a Vertec device to measure jump height. Athletes performed a maximal vertical jump, and the highest vane touched was recorded. The test was conducted before the match and 72 hours post-match, coinciding with the peak of DOMS, and repeated under consistent conditions with a standardized warm-up to ensure reliability [13].

III. Results and Discussion

The normality of data for pain scale, muscular power, and range of motion was analyzed before the application of statistical tests. Normality of data was checked through skewness, kurtosis and Shapiro-Wilk test values. For a sample size of 10. The value of skewness and kurtosis of not less than -2 and not more than 2 conclude that all the variables were normally distributed. As data was found to be normally distributed, parametric tests were applied. Repeated measure ANOVA technique was applied to find within group differences for all outcome measures at different time points.

TABLE 1
SHOWING P-VALUE WITHIN-SUBJECT AND BETWEEN-SUBJECT FOR ALL OUTCOMES MEASURES

Variables	*p*-value	
	Effects	**Source**
PS	< 0.001	0.078
ROM	< 0.001	0.012
L/R	< 0.001	0.014
PWR	< 0.001	0.432

**PS= Pain Scale, *ROM L/R= Rain of Motion Left / Right,*
**PWR= Muscular Power*

Table 1 shows the inferential statistics for PS, ROM, and PWR, which were analyzed using repeated measures ANOVA. The table shows that there was significant improvement in all outcome measures across 5-time frames of treatment in subjects of all groups with p value < 0.05. Figure 1 shows that PNF leads to quicker pain recovery (PS: 2.68 vs. 3.2) and better range of motion (AROM: 131 vs. 123) compared to sport

massage. However, sport massage slightly improves muscular power more than PNF (52.3 vs. 50.9). In conclusion, PNF effectively reduced pain and increased ROM, while sport massage enhanced muscular power. Both therapies significantly impacted all biomarkers, but no significant difference was found between them. Thus, the null hypothesis for pain scale and knee ROM was rejected.

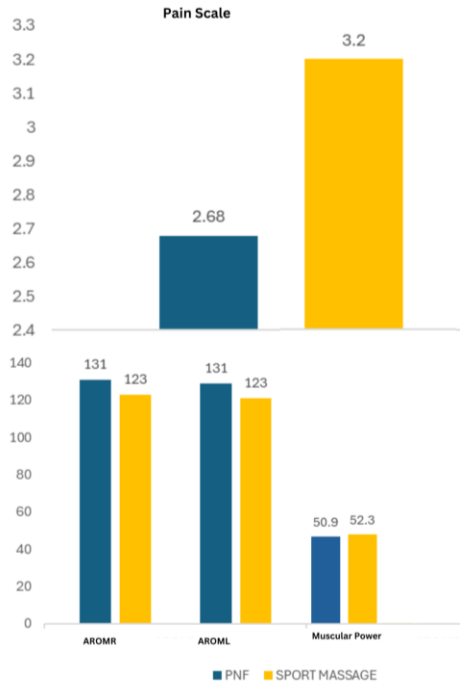

Fig. 1 Showing mean value for range of motion, muscular power and pain scale

IV. CONCLUSIONS

This study examined the effects of Proprioceptive Neuromuscular Facilitation (PNF) stretching and sports massage on muscle soreness, range of motion (ROM), and muscular power among U19 hockey players. Pain was measured using a visual analogue scale (VAS), ROM with a goniometer, and muscular power with a vertical jump test. PNF stretching showed significant improvements in pain reduction and ROM compared to sports massage [1] [11]. However, both treatments had similar outcomes for muscular power [14]. PNF's effectiveness is attributed to increased blood flow, endorphin release, and neuromuscular efficiency, while sports massage aids recovery by reducing inflammation and improving circulation [15] [16]. The findings highlight the benefits of PNF stretching for pain relief and flexibility, which are essential for athletic performance [17] [18].

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Effect of Reward Toward Job Performances Among Employees in Decathlon Petaling Jaya Branch

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Abstract | Performance is critical to organizational success, with efficient employee performance being paramount. Reward systems are an essential component of institutions, fostering reliable performance and behaviour to achieve greater success. This research study examines the impact of rewards on job performance among employees at the Decathlon Petaling Jaya Branch. Utilizing a quantitative methodology, the study employs a survey approach to gather data from employees. The objectives include identifying the types of rewards provided, analyzing job performance, and exploring the relationship between rewards and job performance. The findings indicate a positive correlation between rewards—such as medical aid, bonuses, profit-sharing, and incentives—and employee job performance. However, variations were observed in respondents' perceptions of the adequacy and effectiveness of these rewards. Additionally, the study highlights employees' proactive approaches to task management and timely completion, reflecting a positive work ethic. The conclusions emphasize the crucial role of effective reward systems in enhancing employee job performance and organizational productivity. The study recommends that managers and leaders in the sports retail industry refine and optimize their reward systems to better meet their employees' diverse needs and expectations, thereby contributing to improved job performance and organizational success.

Keywords: *Reward, job performances, sport retailers, employee.*

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I. INTRODUCTION

Organizational success is contingent upon employee performance, which is influenced by a variety of factors, including workplace conditions, employee relations, training, job security, salary, and rewards [1] [6]. Human Resource Management (HRM) employs effective reward systems to attract, retain, and motivate employees, all while ensuring compliance with labour laws [10] [11]. Nevertheless, organisations such as Decathlon are confronted with the challenge of meeting the increasingly high expectations of their employees for both monetary and non-monetary rewards. This can result in decreased motivation, disenchantment, and decreased productivity [2]. The purpose of this investigation is to investigate the influence of rewards on job performance at Decathlon Petaling Jaya, considering the diverse levels of employee satisfaction.

II. METHODS

The study used a quantitative method, surveying 36 employees at Decathlon Petaling Jaya and analysing the results using IBM SPSS Statistics Version 27. The questionnaire, chosen for its ease of use, was limited to individuals with recent performance assessments and familiarity with the reward system, eliminating those who had just been disciplined or were on vacation. It had three sections: demographic information, awareness of the incentive structure (with 19 items from [4] study on a 5-point Likert scale), and job performance as judged by the Individual Work Performance Questionnaire (IWPQ) [7]. Employee performance and behaviour were evaluated using a 5-point Likert scale, with Cronbach's Alpha scores of 0.76 for rewards and 0.89 for job performance, showing reliability.

III. RESULTS AND DISCUSSION

A study that examined the organization's job performance discovered a robust positive correlation between rewards and individual performance. The results indicated a substantial correlation ($r = 0.89$, $p < 0.05$), indicating that job performance increased with the frequency of rewards (Table 1). This implies that employees who receive greater rewards are more likely to excel in their positions. The results underscore the significance of a well-organised reward system in fostering employee motivation and enhancing their productivity.

TABLE 1
CORRELATION BETWEEN THE REWARD AND JOB PERFORMANCE

		Job Performance
Rewards	Pearson's Correlation	0.89**
	Sig. (2-tailed)	0.001
	N	36

*** p < 0.05 level (2-tailed)*

Rewards and employment performance are intricately linked. It is widely held that the productivity and effectiveness of an employee are influenced by their motivation. For organisations to realise their maximum potential, job performance must be at its highest. The organization's performance is directly influenced by the performance of each employee; therefore, it is imperative to investigate and improve the company's reward administration [3]. It is universally acknowledged that employees who are motivated are more productive [8]. An organization's competitive incentive can result in a substantial improvement in job performance [9]. Employee motivation is significantly and positively influenced by rewards and recognition, which in turn influences job performance [8]. Additionally, the alignment of rewards with performance achievements can foster a high-performance culture and maintain employee engagement [8]. Motivation serves as a mediator in the relationship between job performance and reward management [5]. In conclusion, reward administration that is well-designed has the potential to enhance the performance of employees, increase their job satisfaction, and motivate them.

IV. CONCLUSIONS

Research at the Decathlon Shah Alam branch provides valuable insights into the connection between job performance and compensation. The findings show a strong link between rewards like medical aid, bonuses, and incentives, and employee job performance, though there are areas where rewards could better align with employee needs and expectations. The study also highlights that effective rewards motivate proactive and high-performing employees. These results underscore the importance of refining reward systems to boost morale, job satisfaction, and overall organizational effectiveness. This study not only sheds light on the impact of rewards on job performance but also serves as a useful reference for future research and organizational policymaking in the sports retail industry.

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Effect of Sports Massage and Foam Rolling on Muscle Soreness Among Negeri Sembilan Junior League U19 Hockey Players

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Abstract | Hockey players frequently experience muscle pain as a result of the sport's high-intensity nature, which includes explosive movements, fast direction changes, and physical contact. DOMS is an uncomfortable experience or word used to describe muscular soreness, stiffness, tightness, swelling, and weakness that occurs 24 to 72 hours after undertaking a strenuous or unaccustomed activity. There have been studies that show sports massage may be a beneficial method for athletes that helps in speedier recovery, but further research is needed. In addition, studies have shown that foam rollers can help with recovery and reduce the impact of muscle discomfort, although further study is needed. The purpose of this study was to compare the effects of sports massage and foam rolling on reducing muscle soreness in Negeri Sembilan Junior League Hockey Players after a match. Ten people participated in both the sports massage and foam rolling groups. This study used a quasi-experimental design. The participants had a 20-minute sports massage on their lower bodies, while foam rolling began with pinpointing the uncomfortable or tight location of the muscle. Slowly lower your body onto the foam roller until you experience discomfort. Hold this posture for 20 to 30 seconds. Perform one repeat for each muscle group: quadriceps, hamstrings, glutes, and groin. The Participant's pain scale (PS), knee range of motion (ROM), and muscle power (PWR) were measured at five -time points: pre-match, post-match, 24 hours, 48 hours, and 72 hours after treatment. The differences in muscular soreness scores between the two groups were examined using repeated measures ANOVA. The study found that sports massage (SM) and foam rolling (FR) significantly improved pain scale (PS), knee range of motion (ROM), and muscular power (PWR) over five-time frames ($p < 0.05$). As a result, the impact of athletic massage differed significantly from that of foam rolling. Overall, the foam roller was the most effective therapy for hockey players.

Keywords: *Sport massage (SM), foam rolling (FR), delay-onset muscle soreness (DOMS), pain scale (PS), range of motion (ROM), muscular power (PWR).*

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I. INTRODUCTION

Delayed Onset Muscle Soreness (DOMS) is a common type of muscle injury experienced after intense physical activity, often presenting as pain, stiffness, and reduced muscle function. Typically, symptoms appear 8 to 24 hours post-exercise and can persist for up to 96 hours [1]. Various theories suggest that inflammation, connective tissue damage, muscle spasms, and the buildup of lactic acid contribute to the discomfort associated with DOMS. This soreness can hinder athletic performance during practices and competitions, especially for hockey players, who may experience compounded effects from muscle rehabilitation exercises. To mitigate these symptoms, athletes frequently employ recovery strategies such as active recovery, ice baths, massage, and foam rolling.[2] Sports massage therapy, characterized by the rhythmic manipulation of muscle tissues, is praised for its potential therapeutic benefits.[3] While sports massage and foam rolling are widely used to alleviate muscle soreness, there remains a significant gap in research regarding their effectiveness, particularly within the context of hockey players. Previous studies have explored the impact of massage on reducing the symptoms of DOMS but have yielded mixed results regarding its ability to improve muscle function. In light of these gaps and inconsistencies in the existing literature, this research aims to investigate the effects of sports massage and foam rolling on muscle soreness and recovery in Negeri Sembilan Junior League U-19 Hockey Players. By assessing muscular power through vertical jump tests, measuring range of motion, and utilizing pain scale evaluations, this study seeks to provide valuable insights into the effectiveness of these recovery interventions. Ultimately, the goal is to inform coaches and athletes on best practices for managing muscle soreness and improving performance through evidence-based strategies.

II. METHODS

The study used a quasi-experimental design to assess the effects of sports massage and foam rolling on muscle soreness. This design helped establish causal links between the interventions and muscle soreness. Data were collected at five time points: before, immediately after, and 24-, 48-, and 72-hours post-competition. Participants were selected from the Negeri Sembilan junior league U19 hockey team using purposive sampling, focusing on those experiencing DOMS. The required sample size was calculated using G*Power, resulting in 10 participants with a 20% dropout rate, leading to 11 participants. Ten highly trained hockey players from Negeri Sembilan were recruited.

A. Sports Massage

A 30-minute lower body sports massage was used to speed up recovery. Athletes lay face down for assessment and massage. A level 1 certified sports therapist administered a 20-minute massage using water-soluble hypoallergenic oil. Each muscle group (quadriceps, hamstrings, and calves) received 2.5 minutes of massage: 1 minute of effleurage (120 strokes/min), 45 seconds of petrissage (120 strokes/min), and 45 seconds of tapotement (240 contacts/min). Tapotement included 15 seconds each of cupping, hacking, and knuckling [4].

B. Pain Scale – Visual Analogue Scale

Participants assessed their pain levels on a 0-10 scale, with 0 indicating no pain, 1-5 indicating moderate pain, and 6-10 indicating severe pain. The visual analogue scale (VAS) featured a 10-cm horizontal line to quantify pain perception. Participants rated their pain at rest and during movement before and after the intervention, immediately after the match, and at 24-, 48-, and 72-hours post-treatment to evaluate the impact of therapies on discomfort [5].

C. Range of Motion – Goniometer

Active range of motion (AROM) was measured using a goniometer, which consists of a protractor attached to two perpendicular arms. The device was calibrated before each use to ensure accuracy. The knee's range of motion, commonly affected by exercise-induced muscle soreness, was measured before the match, after the match, 24-, 48-, and 72-hours post-treatment. Measurements were recorded on a standardized form [6].

D. Muscular Power – Vertical Jump

The vertical jump test used a Vertec device to measure jump height. Athletes performed a maximal vertical jump, and the highest vane touched was recorded. The test was conducted before the match and 72 hours post-match, coinciding with the peak of DOMS, and repeated under consistent conditions with a standardized warm-up to ensure reliability [7].

III. Results and Discussion

The normality of the data for pain scale, muscular power, and range of motion was assessed before conducting statistical analyses. This was achieved by evaluating skewness, kurtosis, and the Shapiro-Wilk test. Given the sample size of 10, the criteria for normality were met, as the skewness and kurtosis values fell within the range of -2 to 2, indicating that all variables were normally distributed. Consequently, parametric tests were deemed appropriate. To examine within-group differences across various time points, a repeated measures ANOVA was employed for all outcome measures.

TABLE 1

TABLE SHOWING WITHIN SUBJECT AND BETWEEN – SUBJECT FOR ALL OUTCOMES MEASURES

Variables	***p*-value**	
	Effects	***Source***
PS	< 0.001	0.038
ROM	< 0.001	0.297
L/R	< 0.001	0.105
PWR	0.002	0.149

**PS= Pain Scale, *ROM L/R= Rain of Motion Left / Right, *PWR= Muscular Power*

Table 1 shows the inferential statistics for PS, ROM and PWR which were analyzed using repeated measures ANOVA. The table shows that there was significant improvement in all outcome measures across 5 time frames of treatment in subjects of all groups with *p* value < 0.05. Figure 1 shows that Sport massage leads to quicker pain recovery (PS: 3.2 vs. 4.18). However, foam rolling slightly improves ROM and muscular power more than sport massage (AROM 139 vs.123) and (PWR 52.3 vs. 55.9). In conclusion, sport massage effectively reduced pain, while Sport Massage enhanced range of motion and muscular power. Both therapies significantly impacted all biomarkers, but no significant difference was found between them. Thus, the null hypothesis for pain scale and knee ROM was rejected.

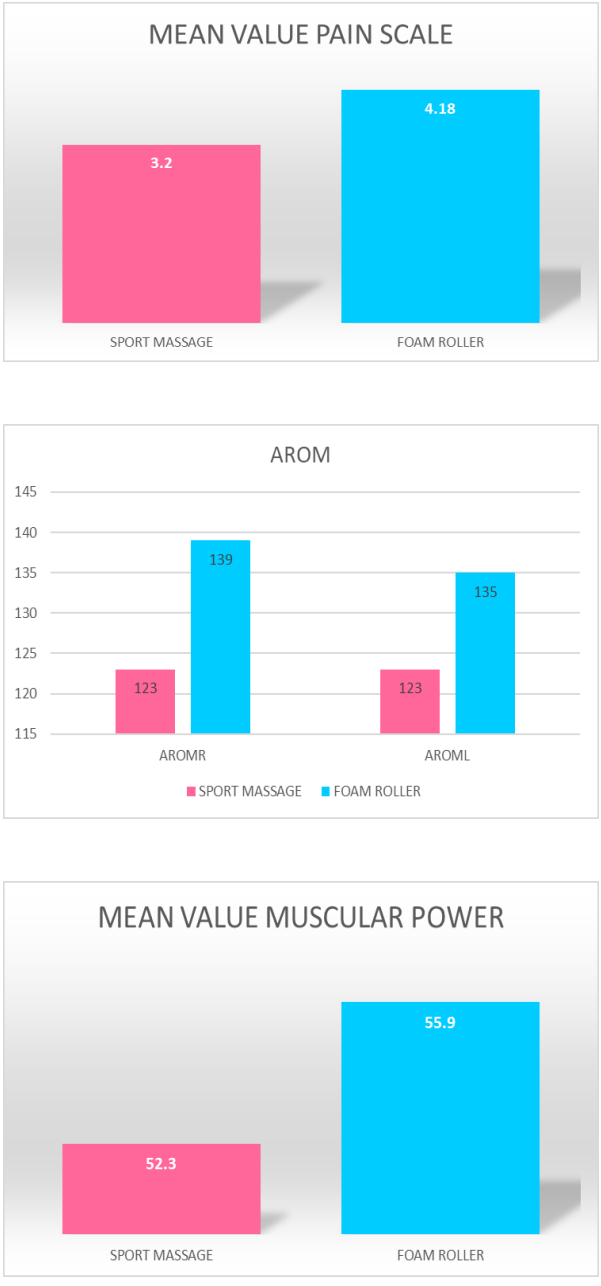

Fig.1 Showing mean value for range of motion, muscular power and pain scale

IV. CONCLUSIONS

This study examined the effects of sports massage and foam rolling on reducing muscle pain in Negeri Sembilan Junior League hockey players after a match. Both treatments significantly improved pain levels, active knee range of motion (AROM), and muscle strength. However, sports massage was more effective in reducing pain, while foam rolling better enhanced AROM and muscle power. These findings suggest that while both methods aid recovery, they have distinct benefits, with sports massage being superior for pain relief and foam rolling for improving flexibility and strength. The results could be applied to optimize recovery strategies for athletes in general.

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Effect of 6-weeks Eccentric vs Concentric Action During Complex Training Among Female Field Hockey Athletes: A Conceptual Paper

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Abstract | Complex training is a combination of weight training and plyometric, where it alternates biomechanically similar high load weight training activities with plyometric exercises in the same program, for example squats and jump squats. The purpose of this study is to investigate the effects of eccentric barbell hip thrusts during complex training (ECT) and concentric barbell hip thrusts during complex training (CCT) on speed, agility, and power in female field hockey athletes. The other objective is to compare the effects of ECT and CCT on speed, agility, and power in female field hockey athletes. Twenty-seven female university athletes will be involved in a 6-weeks of training program. They will be divided into three groups: eccentric BHT during complex training (ECT, n = 9), concentric BHT during complex training (CCT, n = 9), and control group (CG, n = 9). Before and after the intervention, all athletes will assess for pre- and post-test in 20-m sprint test (speed), slalom sprint and dribble test (agility), and the countermovement jump (power). There are many research studies that have insight in the strength and conditioning field, but most of the studies have focused on male athletes, other types of sports and different types of exercise training. This study will provide the improvement of the athlete's on-field performances while reducing the chance of injury, help coaches and trainers to improve their athletes' growth and performances that lead to team's success, and give additional understanding and knowledge to other coaches and researchers.

Keywords: *Complex training, barbell hip thrust, speed, agility, power, field hockey.*

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I. INTRODUCTION

Field hockey is a high-intensity team sport that requires players to compete with the combination of stick skills, footwork, repeated short sprints, tackle, acceleration, deceleration, and changes of direction during matches [7] [4]. Female field hockey athletes are a devoted and skilled group who require training to maximize their athletic performance [4] [6] [10]. Resistance training (RT) has been proven to enhance maximum and explosive strength, leading to improved sports performance in athletes [5] [14]. Indeed, an earlier study, found that resistance training improved the physical strength and endurance of both male and female hockey athletes. Complex training is also known as one of the RT methods to improve athlete's performances.

Complex training (CT) is a combination of weight training and plyometrics, where it alternates biomechanically similar high load weight training activities with plyometric exercises in the same program, for example, squats and jump squats [3]. A recent study showed that a six-week complex-contrast training (CCT) intervention of male field hockey training enhanced 30 m sprint, countermovement jumps with arm swing (CMJA), modified agility T-test (MAT), and isokinetic strength.

Other than that, barbell hip thrust (BHT) is a lower-body exercise that increases the muscular capacity of the hip extensors. This exercise may be beneficial in improving athletic performance while lowering the risk of knee injury due to the unusual posture and weight displacement during the activity [1] [13]. This strengthening activity is different from traditional exercises like split squats, deadlifts, and front or back barbell squats [8]. Lately, BHT has been proposed to improve speed, horizontal force output, and gluteus maximus hypertrophy [1] [2]. Researcher found a potentiation effect on both 10- and 15-m sprints in handball players following a BHT training exercise with either moderate (50% of 1RM) or heavy (85% of 1RM) loads.

Skeletal muscles, which are linked to bones and move them relative to one another, can contract in two ways when activated, which are concentric (CON) and eccentric (ECC). The muscle attachments are brought closer together in the case of CON, whereas they move away from each other in the case of ECC [9]. Many studies have shown that RT primarily consists of ECC (lengthening) contractions that induce greater muscle adaptation responses than training that primarily consists of isometric (ISO) or CON contractions [11] [12] compared ECC-only and CON-only training of the elbow. flexors twice a week for 5 weeks and discovered that muscle thickness of the biceps brachii and brachialis increased after the ECC-only training (7.1%), whereas MVC torque of the elbow flexors increased similarly after the ECC-only (22.5%) and CON-only (26.0%) training.

Even with numerous developments in sports science research, there is still a considerable gap in our understanding of the effects of ECC and CON during CT on female athletes. Even though there are many research studies that have insight in the strength and conditioning field, most of the studies have focused on male athletes, other types of sports, and different types of exercise training. This shows a gap in targeted research on how this CT method might affect the performances in speed, agility, and power among female field hockey athletes. Thus, this current research seeks to compare the effects of eccentric (ECT) and concentric (CCT) during complex training on speed, agility, and power among female field hockey athletes.

A. Speed

In multiple studies investigating the effects of CT on sprint performance, athletes who participated in CT showed consistent improvements. It also reported significant improvements in 20-meter sprint performance among university soccer players after an 8-week complex training program. The complex group improved from 3.19 ± 0.18 seconds to 3.06 ± 0.13 seconds, while the control group showed modest change. They also found substantial increases in male handball players' 10-meter and 20-meter linear sprints following a 12-week compound strength training program, with both the compound and complex strength training groups exhibiting significant gains, especially in the 10-meter sprint.

B. Agility

Athletes that followed CT programs showed considerable increases in agility. Past study discovered that during an 8-week period, 18 male futsal players' agility performance, as evaluated by the Illinois agility test, remained consistent in the complex group while somewhat improving in the control group. Moreover, past researcher examined the impact of a 12-week strength training program on repeated sprint ability (RSA) and change-of-direction (COD) sprints in 20 male handball players. The compound strength training group demonstrated small RSA increases, while the complex strength training group had more substantial benefits, however, both groups saw slight COD decreases.

C. Power

In addition, these studies showed the effect of CT in improving jump performance across several sports. A previous study found significant improvement in lateral cone jump (LCJ) and stationary vertical jump (SVJ) among male university-level cricket players after a 4-week training program, with the plyometric training group (PTG) and complex training group (CTG) showing the most development. Moreover, previous study found that futsal players improved their countermovement jump (CMJ) performance after an 8-week training program. These studies show CT methods suitable to different groups of athletes and efficacy in improving power performance.

II. METHODS

The research design for this study will be true-experimental design, as it will investigate the effect of ECC and CON during CT on speed, agility, and power among female field hockey athletes. This study will involve 27 female hockey athletes aged from 18-25 years old. The inclusion criteria of the athlete are to have at least two years of resistance training and competitive experience in field hockey and must be able to perform a back squat at least 0.8 kg of body weight. The athletes will be randomly assigned with a total of 9 athletes in each group, either eccentric complex training (ECT), concentric complex training (CCT), or control group (CG).

Before starting the intervention, all athletes will undergo a familiarization session. The second week will continue with anthropometry and 1RM sessions. Then, pre-test in the third week. The following weeks will be the 6-week training program, and post-test in the final week. The ECT and CCT groups will be

involved in a 6-week training program, two sessions per week, while CG will be doing normal field hockey training. This study will have pre- and post-tests of speed, agility, and power. Speed will be assessed with a 20-meter sprint test, agility with the Slalom Sprint and Dribble Test (SlalomSDT), and power with the CMJ test. Both speed and agility tests will be measured using timing gates, while power will be recorded using an application, My Jump 2.

III. CONCLUSIONS

Based on the study's objectives, the finding from this study is that it can help athletes improve their on-field performance while reducing their chance of injury. Then, this study may help coaches and trainers to improve their athletes' performances. Last but not least, this study may also give additional information and understanding in the field of sports science, not only for coaches but also researchers.

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Effects of High-intensity Interval Training Towards Agility and Vertical Jump Among Female Volleyball Athletes: A Conceptual Study

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Abstract | This narrative review investigates the effects of high-intensity interval training (HIIT) on agility and vertical jump performance among female volleyball athletes. While HIIT is widely recognized for its ability to enhance cardiovascular endurance and overall muscular strength, its specific impact on agility and vertical jump performance remains underexplored. The review synthesizes existing literature, revealing mixed results across various studies. Some research indicates potential benefits of HIIT in improving general physical fitness, which may indirectly support agility and jumping ability. However, other studies show that HIIT alone may not be sufficient to significantly enhance these specific performance metrics. The findings suggest that while HIIT can be an effective component of a broader training regimen, it may need to be combined with sport-specific drills, such as targeted agility exercises and plyometrics, to optimize performance outcomes in female volleyball players. This review highlights the need for further research, particularly studies that focus on gender-specific adaptations to HIIT, to better understand its efficacy in improving agility and vertical jump performance in female athletes. The review reveals that while HIIT is effective in enhancing overall cardiovascular and muscular endurance, its specific impact on agility and vertical jump performance in female volleyball players remains inconclusive, with mixed results across the studies reviewed. The evidence suggests that while HIIT may contribute to general fitness improvements that could indirectly benefit agility and jumping ability, it may not be sufficient as a standalone training approach for optimizing these specific skills.

Keywords: *Volleyball, high intensity interval training, HIIT, vertical jump, agility, female, physical performance.*

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I. INTRODUCTION

Volleyball, introduced by Professor William G. Morgan in 1895, originated as "mintonette," a game inspired by the Italian sport "Faustball" [1]. As the sport grew in popularity, research has increasingly focused on optimizing training for improved performance, particularly for female athletes, where muscle strength and technical skills are critical [2] [3].

High-intensity interval training (HIIT) targets both aerobic and anaerobic systems [4] and is recognized for improving cardiovascular endurance and overall strength [5]. It involves alternating short, intense exercise intervals with brief recovery periods, making it a highly effective training strategy [6] [7].

Agility and jump performance are critical for success in volleyball [8], as they enable quick directional changes and explosive power, which are essential for executing complex movements and directly impact overall performance [8].

Recent studies highlight vertical jump performance as a key indicator of lower-body power [9] and overall explosive strength, crucial for both offensive and defensive actions in volleyball, such as spiking and blocking [10]. While various training methods target jump height, integrating HIIT offers a unique approach to enhancing explosive power and agility, essential for quick transitions on the court. Existing research demonstrates that HIIT can significantly improve jump performance, as seen in studies with young female handball players [11] and amateur wushu sanda athletes [12], who exhibited notable gains in countermovement and horizontal jump measures.

Agility involves rapid directional changes, while maintaining control and balance is equally vital in volleyball [13]. Quick responses to the dynamic nature of the game significantly impact player effectiveness. Existing literature on HIIT's impact on agility in other sports suggests promising outcomes. For instance, studies on youth soccer players [14] and taekwondo athletes [15] demonstrated significant improvements in agility metrics following HIIT interventions. Additionally, research on female basketball players [16] indicated that HIIT is as effective as traditional plyometric training in enhancing agility.

Research done by [14], demonstrated that a short-term HIIT program significantly improved agility, as shown by better performance in the Illinois agility test. While [12] further support these findings by demonstrating the benefits of HIIT in enhancing neuromuscular capabilities, particularly vertical jump performance. In their study, amateur wushu sanda athletes underwent a 4-week HIIT protocol incorporated into their regular training. The results revealed significant improvements in the countermovement jump (CMJ), with athletes achieving greater jump height and enhanced explosive power.

Existing research on the effects between HIIT and athletic performance predominantly focuses on general fitness improvements or male athletes, leaving a gap in understanding its effects on female volleyball players [17]. This included emphasizing the need for more studies specifically examining the effects of HIIT on female athletes, particularly in volleyball, as much of the existing literature focuses on male athletes or mixed-gender groups [18].

A. Effect of HITT towards agility and vertical jump in volleyball

This conceptual study investigated the effects of HIIT on agility and vertical jump performance among volleyball athletes by synthesizing existing literature.

The literature suggests that while HIIT improves cardiovascular endurance and overall strength [4], its impact on agility and vertical jump performance is inconsistent with mixed results across the studies

reviewed. Some studies show potential benefits, but others, such as [19], found no significant agility improvements, illustrating the complexity of this skill. The 4-week HIIT practice did not affect agility performance in volleyball players, indicating that while HIIT may lead to short-term improvements in agility, it does not result in long-term enhancements.

Regarding jump performance, no direct evidence of significant improvements following HIIT in volleyball players was found. As reported by [20], suggest that HIIT might contribute to better jump performance from the comparison between the groups shown more significant effects on the experimental group rather than control group. Moreover, the results indicate that the HIIT discussed more effectively enhances athletes' physical coordination compared to traditional volleyball physical training. The experimental group showed a significantly greater improvement than the control group, demonstrating the superiority of the HIIT method for physical coordination.

II. METHODS

This study utilizes a randomized pre-test and post-test design to evaluate the effects of a 6-week training program on female volleyball athletes. A sample of 36 participants, aged 18 to 25, who meet specific inclusion criteria (four years of experience, injury-free for six months, and amateur-level status), are randomly allocated to either a HIIT group or a control group. The HIIT protocol, as adopted from [16], was performed twice per week with progressively increasing intensity over the 6-week period, while the control group continued their regular volleyball training routine. Agility is assessed using the T-test drill, with performance measured by a timing gate system ($r = 0.73$), and jump performance is evaluated through the vertical jump test, utilizing the MyJump 2 application to capture metrics such as jump height, flight time, and power ($r = 0.93$).

The study is conducted over five sessions. In Session 1, athletes are familiarized with the testing procedures to ensure their comfort and safety. Session 2 involves screening, which includes anthropometric measurements (height, weight, and body fat percentage). Sessions 3 is the pre-test phase, where agility and vertical jump tests are administered. In Session 4, participants undergo the 6-week intervention. Session 5 concludes the study with post-testing, where the agility and vertical jump assessments are repeated to determine the training's impact.

III. CONCLUSIONS

In conclusion, the objective of this conceptual study is to examine the effects of HIIT on agility and vertical jump performance among female volleyball athletes by synthesizing existing literature. The evidence suggests that although HIIT may contribute to general fitness improvements that could indirectly benefit agility and jumping ability, it may not be sufficient as a standalone training approach for optimizing these specific skills, which may need to be combined with more sport-specific training interventions [21] to achieve significant improvements in physical performance. The findings from this study may assist coaches and trainers in improving their athletes' performance. Additionally, it provides valuable insights for both coaches and researchers, contributing to the broader field of sports science.

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Gender Difference in Fatigue Index and Power Output

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Abstract | Understanding how men and women react differently to high-intensity exercise is critical for designing effective training regimens. Research suggests that men can become fatigued even if they generally have a greater peak strength compared to women. This study investigates potential sex-based differences in fatigue resistance and power production. Healthy volunteers of both genders will go through a Running-Based Anaerobic Sprint Test (RAST) methodology. The RAST measures peak power output (PPO), which is the greatest power generated during a sprint, and fatigue index, which is the drop in power output during repeated sprints. Twenty-four ($N = 24$) participants were divided into two groups, twelve ($n = 12$) male participants and twelve ($n = 12$) female participants, to perform RAST. The statistical study will compare these measures across genders. This study seeks to determine if men and women differ significantly in fatigue resistance and power generation during high-intensity exercise. The findings can help to build gender-specific training tactics that address each sex's unique physiological responses. An Independent Sample T-Test was used to analyse the data obtained. The minimum power output recorded for females was ($M = 94.3$, $SD = 35.7$), whereas male data reported that the minimum power output was ($M = 136.8$, $SD = 51.1$) with $p = 0.027$. The maximum power was ($M = 251.2$, $SD = 42.8$) for female participants and males was ($M = 504.2$, $SD = 345.9$), and the p-value reported was 0.020. The findings of the fatigue index results showed that females had ($M = 3.30$, $SD = 0.77$) while males showed ($M = 8.92$, $SD = 8.01$) with a significant p-value of 0.024. The results indicated there was a significant difference in power output and fatigue index between males and females.

Keywords: *Gender, fatigue index, power output.*

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I. INTRODUCTION

Understanding the disparities in power output and fatigue between men and women requires considering several factors. While males have higher peak strength, they tend to exhaust more quickly, most likely due to a higher proportion of fast-twitch muscle fibres, which are geared for brief bursts of power but tire faster. In contrast, women have more slow-twitch fibres, which aid in endurance and fatigue resistance. Hormones also play a role: testosterone increases muscular growth and peak power in men, while oestrogen helps women avoid exhaustion. Psychological and social factors, such as stress and societal expectations, can influence how men and women perceive exhaustion.

The variations in power output and fatigue index between genders are investigated in this study. The evidence is conflicting, with some studies revealing no discernible gender differences while others suggest that males have higher peak power but tire more quickly [9] [11]. Through a thorough analysis of these variables, this study seeks to determine if men and women feel fatigue and power decline during exercise in different ways. This information will be useful in designing more specialised training regimens that maximise performance and effectively manage fatigue for both genders.

II. METHODS

The major approach for collecting data for this study is the Running-Based Anaerobic Sprint Test (RAST), which is used to examine gender differences in fatigue index and power output. To answer the question of whether there is any difference between genders in these two variables, the research is set up as a cross-sectional study. Accurate measurement of the important variables is made possible by the study design, which guarantees the validity and reliability of the data collection methods. Six 35-meter sprints will be performed by participants, who will be chosen according to predetermined standards, with 10-second rest intervals in between. The results of the study will be examined considering the body of prior research, with an emphasis on the research question, to advance our knowledge of how gender influences variations in athletic performance.

The study uses an experimental methodology for data analysis to investigate any gender differences in fatigue index and power output. The statistical analysis will be conducted using Jamovi software version 2.3.28, which will include Independent Sample T-Tests to compare the power output and mean fatigue index between the male and female groups. The findings will indicate whether the responses of men and women to high-intensity exercise differ statistically significantly. This methodology guarantees a thorough analysis of gender differences and adds significant insights to the field of sports science. It is bolstered using validated instruments such as PAR-Q+ and RAST [3] [8].

III. RESULTS AND DISCUSSION

The objective of the study is to determine the disparity in fatigue index and power output between genders. A total of 24 candidates from the Faculty of Administrative Science and Policy Studies at UiTM Seremban 3 were selected to take part in this examination. The participants were categorised into two cohorts based on their gender, specifically male and female, and underwent the Running-Based Anaerobic Sprint Test (RAST). The data obtained from this investigation were evaluated and analysed using the

statistical software Jamovi. This chapter begins by examining the descriptive analysis, followed by an exploration of the Independent Sample T-Test, and concludes with a summary. The test consisted of 12 male participants and 12 female participants.

This study employed the RAST (Repeated Anaerobic Sprint Test) protocol, in which subjects performed six 35-meter sprints with 10 seconds of rest between each sprint. The descriptive data revealed that the standard deviation for maximum power output for males was 345.883, while for females it was 42.780. The mean maximum power output for males was 504.17, while for females it was 251.17.

Additionally, the table shows that the standard deviation for minimum power output in the Faculty of Administrative Science and Policy Studies at UiTM Seremban 3 for males was 51.092, while for females it was 35.668. The mean minimum power output for males was 136.75, while for females, it was 94.25. Lastly, the results revealed that the standard deviation for the fatigue index for males was 8.011, while for females it was 0.765. The mean fatigue index for males was 8.92, while for females it was 3.30. The Independent Sample T-Test showed statistically significant differences in maximum power output (p = 0.020), minimum power output (p = 0.027), and fatigue index (p = 0.024) between genders.

TABLE 1
DESCRIPTIVE DATA FOR GENDER DIFFERENCE IN FATIGUE INDEX AND POWER OUTPUT

Variables	**Mean (Male)**	**SD (Male)**	**Mean (Female)**	**SD (Female)**	***p*-value**
Maximum Power Output	504.17	345.883	251.17	42.780	0.020
Minimum Power Output	136.75	51.092	94.25	35.668	0.027
Fatigue Index	8.92	8.011	3.30	0.765	0.024

Through the use of Independent T-Tests and a quantitative approach with a descriptive design, this study discovered that, whereas male individuals showed higher maximum and minimum power outputs, female participants showed stronger fatigue resistance. The hypotheses were supported by data, which underwent analysis using Jamovi and showed substantial gender differences in tiredness index and power output. These results are consistent with previous studies, showing that men and women differ physiologically in terms of muscle strength, endurance, and power production.

IV. CONCLUSIONS

This study extensively examined the research findings about gender differences in fatigue index and power output. The study reveals notable discrepancies between male and female participants in relation to physiological responses and performance measures. Male participants exhibited a higher average minimum power output, demonstrating the ability to sustain higher power levels even during less intense activity. This can be attributed to their larger muscle mass and strength. Women demonstrated superior fatigue resistance, as seen by a lower fatigue index, enabling them to endure extended periods of exercise without experiencing rapid weariness. Men exhibited greater maximal power outputs under vigorous physical exertion, which can be attributed to an increase in muscle mass and alterations in fibre composition. These findings emphasise the necessity of training programs that are tailored to specific genders.

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How Depression, Anxiety and Stress (Mental Health) are Related to Sleep Quality During Ramadan Fasting Among UiTM Seremban 3 Faculty of Sports Science and Recreation Students

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Abstract | One of the five pillars of Islam are to be fasting during the holy month of Ramadan according to the Qur'an. During Ramadan, Muslims avoid all food and drink, smoking and immoral behaviour from dawn until sunset. Numerous studies have documented the different impacts of fasting during Ramadan on sleep quality and mental health. For instance, Muslims rise early to attend the pre-dawn meal known as Suhur and the morning prayer (Fajr). The study examines how sleep quality, depression, anxiety, and stress are related among students while fasting during Ramadan. The participants for this study were 349 students from the Faculty of Sport Science & Recreation UiTM Seremban 3. Its goal is to recognize any alterations in sleep quality throughout this time and how these mental factors come together, possibly impacting overall mental wellness and quality of life. The study employs surveys to collect information from students at UiTM Seremban 3 Faculty of Sport Science and Recreation, with a specific focus on how fasting impacts mental well-being. Pearson correlation coefficient was used to analyse the data obtained. It shows that there is a significant relationship ($p < 0.05$) between all the variables. However, the result shows that the association of sleep quality between depression ($r = 0.173$) and anxiety ($r = 0.176$) had low strength of relationship. While the association of sleep quality between stress ($r = 0.342$) had moderate strength of relationship.

Keywords: *Sleep quality, depression, anxiety, stress, mental health.*

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I. INTRODUCTION

Ramadan is a time of strong significance for Muslims worldwide. Since it is thought to have been the month that the Prophet Muhammad received his first revelation of the Quran, the holy book of Islam, it is revered as the holiest month in Islam. Muslims observe fasting from sunrise to sunset throughout Ramadan, fasting from all food and beverages, smoking, and immoral activity. Examining the various ways that Ramadan fasting affects mental health and sleep quality can provide important new perspectives on the complex connection that exists between religious observance, psychological changes, and mental health.

During Ramadan, sleep latency increases, and sleep architecture modifications occur, leading to decreased sleep period time, total sleep time, and increased non-rapid eye movement sleep. Ramadan is frequently linked to more get-togethers and social events. Although this can be a helpful way to connect and get support, it can also result in more social commitments and changes to sleep patterns. Ramadan disrupts sleep patterns due to changes in meal timings and increased nighttime activity, leading to delayed bedtimes, reduced sleep duration, and fragmented sleep [1] [2] [3]. The increasing body temperature and metabolic activity of late-night meals after breaking fast (Suhoor) can further disturb the structure of sleep. It's crucial to attempt to concentrate on thinking positively because withdrawing from food and drink might alter your mental state. Good thoughts elevate your state of mind and can lead to greater optimism and joy. Ramadan has a consistently lower number of psychiatric hospitalizations compared to other months, with a trend towards increased enforced hospitalizations [4].

II. METHODS

Survey was the best way to fully understand the relationships among university students' depression, anxiety and stress level and sleep quality. This study was quantitative research. Two questionnaires will be distributed to the participants. The major objective of this research was to identify the interconnection of sleep quality between mental health. The results of this research will be correlated with sleep quality, depression, anxiety and stress during Ramadan fasting.

Using the Krejcie and Morgan approach, we could decide the sample size required to draw valid conclusions about the population. Referring to the Krejcie and Morgan Table, 291 was obtained because the population for students in UiTM Seremban 3 Faculty of Sport Science and Recreation were 1238. To avoid unwanted error in the results 20% will be added to the sample size. 349 participants will be the final sample size after adding 20% of the dropout rate. Depression Anxiety and Stress Scale (DASS 42) questionnaires had been utilized to measure mental health level while quality of sleep was measured using the Sleep Quality Scale (SQS) questionnaire.

III. RESULTS AND DISCUSSION

The descriptive statistics of depression, anxiety and stress levels among students at the UiTM Seremban 3 Faculty of Sports Science & Recreation during Ramadan fasting shown in table 1. A total of 191 male and 158 female students partakes in this research, making the total number of samples 349. The analysis indicates that the standard deviation for depression among students was 2.82. Mean depression outcome was 5.92. The minimum depression result was 0, and the highest was 14. Additionally, the table

shows that the standard deviation for anxiety among students in Faculty Sports Science & Recreation Seremban 3 was 2.36. The mean anxiety mark was 5.69. The lowest anxiety rate was 0, while the highest anxiety score was 14. Lastly, the results revealed that the standard deviation for stress was 4.04. The Mean stress mark was 7.01. The lowest stress count was 0, while the maximum score was 18.

TABLE 1
DESCRIPTIVE TABLE FOR DEPRESSION, ANXIETY & STRESS

	N	Mean	*SD*	Minimum	Maximum
Depression	349	5.92	2.82	0	14
Anxiety	349	5.69	2.36	0	14
Stress	349	7.01	4.04	0	18

Table 2 shows the sleep quality during Ramadan fasting among students at the UiTM Seremban 3 Faculty of Sport Science & Recreation. The statistical analysis indicates that the mean sleep quality score was 28.0. The standard deviation for sleep quality scores was 12.5. The minimum sleep quality score was 0. The maximum sleep quality score was 69.

TABLE 2
DESCRIPTIVE TABLE FOR SLEEP QUALITY

	N	Mean	*SD*	Minimum	Maximum
Sleep Quality	349	28.0	12.5	0	69

A. Interconnection Of Sleep Quality Between Depression, Anxiety & Stress During Ramadan Fasting

Pearson correlation coefficient has been done to indicate if there was any significant correlation of sleep quality between depression, anxiety, and stress during Ramadan fasting. The p value given was less than 0.05 to determine the significant interconnection. A significant relationship between sleep quality and depression ($p = 0.001$) during Ramadan fasting was shown. Depression correlates with sleep quality ($r = 0.173$) during Ramadan fasting. The null hypothesis was rejected. A significant association between anxiety and quality of sleep during Ramadan fasting ($p < 0.001$). The interconnection between anxiety and quality of sleep ($r = 0.176$). There was a significant link between stress and sleep quality ($p < 0.001$). The connection between stress and sleep quality were moderate in strength ($r = 0.342$). All null hypotheses were rejected.

TABLE 3
RELATIONSHIP OF SLEEP QUALITY BETWEEN DEPRESSION, ANXIETY & STRESS DURING RAMADAN FASTING

Variable	Pearson's r	*df*	*p*-value
Depression	0.173	347	0.001
Anxiety	0.176	347	< 0.001
Stress	0.342	347	< 0.001

IV. CONCLUSIONS

Insufficient amount of sleep will enlarge the risk of getting mental health (depression, anxiety and stress) problems. We can see that during Ramadan fasting sleep quality was not at the optimal level however the depression, anxiety and stress level are at the best state. This is because various factors play a major role in the association of sleep quality and mental health. To conclude this study, we might see significant relationships between all the variables among UiTM Seremban 3 Faculty of Sports Science and Recreation students. By improving the quality of sleep the risk of mental health (depression, anxiety and stress) disorder will be reduced.

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Identification of Types of Drop Techniques with Pulling on Pencak Silat Matches Regulation in 2022

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Abstract | Changes to the pencak silat regulations in 2022 regarding technical playing in the sparring category pencak silat athletes have an impact on the emergence of new types of fall techniques. But until now, there has been no scientific evaluation or discussion of the types of fall techniques with the pull that have been used. Therefore, this research aims to analyze the types of fall techniques with pulls in the sparring category pencak silat athletes as the first step of evaluating and learning techniques in depth. This research method uses a visual research method with qualitative and quantitative data analysis techniques. The number of subjects identified was 354 videos of matches in 2023 with details, 155 videos from provincial championships, 161 videos from national championships, and 38 from international championships. The research findings are eleven types of fall techniques with pulls described qualitatively. From the results of quantitative data, it is known that three types of techniques are often used in provincial, national, and international matches, including type 6 – pull, catch, and sweep (25.61%), type 3 – pull and cutout (19.35%), and type 5 – pull and side fall hook (18.77%).

Keywords: *Pencak silat, regulation 2022, drop technique with pull.*

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I. INTRODUCTION

Pencak silat is a competitive sport that is officially contested at both national and international levels. As a result, countries that develop pencak silat strive to win championships through optimal performance development by utilizing advancements in sports science and technology [1]. Pencak silat is a martial art or combat sport. Combat sports involve two individual combatants opposing each other under predetermined rules and techniques with the goal of achieving victory and defeating their opponent [2]. Pencak silat is a sport that combines elements of art and sports with a competitive nature, requiring specific competition rules (Ihsan, 2018). Every sport undergoes development, especially in terms of competition rules. Therefore, it is natural that pencak silat rules have undergone updates and gameplay developments since 1980, resulting in the 2022 pencak silat rules that align with global martial arts trends.

Technique is a crucial component of pencak silat. A pencak silat athlete must master techniques to win competitions. Fundamentally, the principle of victory in pencak silat is to accumulate as many technical points as possible. Additionally, technique is essential for coaches in competitive sports to determine characteristics and benchmarks for designing training programs [3]. Technique is part of the specialization principle in specific sports. The specialization principle, or specificity, refers to training that must be tailored to the specific needs of a particular sport [4]. Technique itself is a training component to solidify tactics and strategies in competition [5]. In competitive pencak silat, techniques are not limited to direct punches and kicks but involve attacking and defending movements (counterattacks) and takedowns using various techniques [3].

Based on several theoretical studies on techniques, all pencak silat practitioners should understand the basic techniques of competition as a foundation for creating training programs and devising tactics and strategies. However, the technical changes in the 2022 rules have forced all pencak silat practitioners to readjust to the game of pencak silat. This is because technical changes impact the playing style and give rise to new types of techniques, especially pulling-based takedowns, which remain highly controversial.

Previous research identified several techniques that determine victory, including kicking techniques, punching techniques, takedowns with grip, and takedowns without grips, kicks with blocks, punches with blocks, and points at the opponent's fouls [6]. However, this research did not include the victory points from pulling-based takedowns, as the subjects were matches under the 2016 rules. Based on this research, it can be inferred that pulling-based takedowns are a newly emerged technique that requires in-depth identification as an initial step in evaluating and learning about the types of takedowns in pencak silat competitions under the 2022 rules.

Pulling-based takedowns are part of the basic takedown techniques that competitive pencak silat athletes must master, as new types of pulling-based takedowns have emerged in pencak silat competitions. In the researcher's initial observations of a match at the 19th World Pencak Silat Championship Malaysia Open, two types of pulling-based takedowns were found: one combined with a scissor technique and the other combined with a sweeping technique. This indicates the development of new techniques in pencak silat, especially pulling-based takedowns. However, there has been no research or case study on the types of pulling-based takedowns in competitive pencak silat athletes since the change in pencak silat rules in 2022. Yet, it is necessary to identify techniques or conduct research to study the latest rules as an initial step in developing pencak silat under the 2022 rules so that all pencak silat practitioners can easily learn the techniques of competition.

Based on these findings, the researcher is interested in conducting research that identifies the types of pulling-based takedowns in pencak silat since the rule change in 2022. The researcher views this rule

change as a new development that must be identified to bring about improvements in pencak silat, making it more effective, dynamic, and engaging. This research aims to determine the types of pulling-based takedowns in pencak silat competitions at the provincial, national, and international levels. The findings of this research are expected to serve as a reference for learning and developing techniques as a basis for creating training programs for technique, physical fitness, tactics, and playing strategies.

II. METHODS

This research is a type of survey research using a descriptive approach. The descriptive approach is an attempt to describe data based on events or phenomena that occur in the present based on facts. Qualitative descriptive research is done by writing the analysis in a descriptive form of observation. Meanwhile, quantitative descriptive is done by explaining the observed phenomenon in the form of numbers. The conclusion of quantitative data analysis is obtained using the percentage formula, namely, $P = (f) / n \times 100\%$.

This research method uses visual research method, which is an observation technique that utilizes visual media, namely video. The group of data objects is in the form of video recordings of the 2022 regulation pencak silat match. The number of videos identified was 354, consisting of 155 videos from provincial championships, 161 videos from national championships, and 38 videos from international championships. The limit of video data search and retrieval is from July 2023 to March 2024.

III. RESULTS AND DISCUSSION

A. Results

Based on the results of the analysis and identification of types of pulling-based takedown techniques in the 2022 pencak silat competition rules, the researcher found 11 techniques. These eleven techniques are performed with various combinations, including:

i. Technique 1 – Direct Pull

This technique begins by gripping the upper part of the body protector with one hand. Then, the body protector is pulled downward or thrown backward with a strong pull. This pulling technique is performed using the strength of the hands and shoulders, and by utilizing the body's weight to maximize pulling power. A video of Technique 1 – Direct Pull can be found at the following link https://bit.um.ac.id/Teknik1.

Fig. 1 Direct pull

ii. Technique 2 – Pull and Sweep

Begins by gripping the upper part of the body protector. The movement is then continued by catching one of the opponent's legs. The technique is finished by pulling the body downward until the opponent falls, followed by a backward step in sync with the pulling motion. The final position in this technique should maintain a distance from the opponent's reach and keep the stance ready https://bit.ly/Teknik_2.

Fig.2 Pull and sweep

iii. Technique 3 – Pull and Front Scissor

Starting from a fighting stance, grip the upper part of the body protector with one hand. Next, perform a front scissor technique, targeting both legs or one leg to disrupt the opponent's balance. The scissor technique involves trapping both legs around the opponent's neck, waist, or legs. The technique is completed by simultaneously pulling the upper body with one hand and performing the front scissor until the opponent falls https://bit.ly/Teknik_3.

Fig.3 Pull and front scissor

iv. Technique 4 – Pull and Cross Scissor

The pull and cross scissor technique involves pulling the upper part of the body protector and performing a cross scissor. A cross scissor is a technique where both legs, the lower limbs, and the midsection/hip are trapped. This technique begins by gripping the body protector, followed by performing a cross scissor targeting the midsection or lower body https://bit.ly/Teknik_4.

Fig.4 Pull and cross scissor

v. Technique 5 – Pull and Side Sweeping Takedown

This technique begins by gripping the upper part of the body protector and continues with a leg attack using a sweeping technique, causing a sideways fall. The sideways fall is executed by initiating a hook and then dropping the body to the side. The hook is a lower leg attack https://bit.ly/Teknik5.

Fig.5 Pull and side sweeping takedown

vi. Technique 6 – Pull, Grab, and Sweeping Trip

This technique begins by gripping the upper part of the body protector and grabbing one of the opponent's legs. Then, attack the lower supporting leg to trip the opponent with a sweeping motion, accompanied by pulling the upper part of the body protector downward until the opponent falls https://bit.ly/Teknik_6.

Fig.6 Pull, grab, and sweeping trip

vii. Technique 7 – Pull, Grab, and Scissor

Starting with a grip on the upper part of the body protector using one hand and grabbing one part of the opponent's leg. This is followed by a front scissor technique, targeting one of the supporting legs. The technique is completed by simultaneously pulling the upper part of the body protector with one hand and performing the front scissor until the opponent falls https://bit.ly/Teknik_7.

Fig .7 Pull, grab and scissor

viii. Technique 8 – Pulling the Upper Body and Lower Body

Begin by gripping the upper part of the body protector. Then, pull the body protector downward with force using the hands while simultaneously pulling one of the opponent's legs, either right or left. The downward pull of the body protector is accompanied by a step forward to close the distance with the opponent. After stepping in, reach for the leg with the hand to pull it and disrupt the leg movement,

destabilizing the opponent's stance. Pull both the upper and lower body until the opponent falls https://bit.ly/Teknik_8.

Fig.8 Pulling the upper body and lower body

ix. Technique 9 – Pulling and Leg Hook

This technique begins by gripping the front or back of the body protector while simultaneously performing an inside leg hook. The hook is executed by swinging the leg inward from the outside. Once the opponent is brought down by the hook, maintain a strong fighting stance to anticipate any counterattacks https://bit.ly/Teknik_9.

Fig.9 Pulling and leg hook

x. Technique 10 – Pulling and Rear Leg Hook

This technique begins by gripping the front of the opponent's body protector. The manoeuvre involves pulling the opponent's upper body backward, causing them to fall. Simultaneously, a rear leg hook is performed in the opposite direction of the pull. Once the opponent is down, maintain a strong stance to defend against any counterattacks https://bit.ly/Teknik_10.

Fig.10 Pulling and rear leg hook

xi. Technique 11 – Pull and Push

This technique involves two types of attacks: pulling and pushing. The technique begins by pulling the upper part of the body protector downward. This is followed by pulling the lower part of the leg and pushing the upper body until the opponent falls https://bit.ly/Teknik_11.

Fig.11 Pull and push

TABLE I
QUANTITATIVE ANALYSIS

Type	Province		National		International		Total	
	n	**%**	***n***	**%**	***n***	**%**	***N***	**%**
Technique 1	71	20,58	76	15,02	8	4,65	155	15,15
Technique 2	7	2,03	8	1,58	5	2,91	20	1,96
Technique 3	65	18,84	96	18,97	37	21,51	198	19,35
Technique 4	28	8,12	4	0,79	5	2,91	37	3,62
Technique 5	57	16,52	98	19,37	37	21,51	192	18,77
Technique 6	63	18,26	150	29,64	49	28,49	262	25,61
Technique 7	5	1,45	11	2,17	11	6,40	27	2,64
Technique 8	37	10,72	44	8,70	8	4,65	89	8,70
Technique 9	5	1,45	8	1,58	2	1,16	15	1,47
Technique 10	7	2,03	1	0,20	0	0,00	8	0,78
Technique 11	0	0,00	10	1,98	10	5,81	20	1,96
Total	345	100,00	506	100,00	172	100,00	1023	100,00

B. Discussion

A quantitative analysis of this research reveals that the three most frequently used techniques at the provincial level are Technique 1 (20.58%), Technique 3 (18.84%), and Technique 6 (18.26%). At the national level, the top three techniques are Technique 6 (29.64%), Technique 5 (19.37%), and Technique 3 (18.97%). Internationally, the most common techniques are Technique 6 (25.61%), Technique 5 (21.51%), and Technique 3 (21.51%). Overall, the most widely used technique is Technique 6 (25.61%), followed by Technique 3 (19.35%), and Technique 5 (18.77%). These results are summarized in the table below.

Based on the research results, eleven types of pulling takedown techniques were found. Pulling takedown techniques have had an impact on changing the playing style of pencak silat athletes when compared to the 2016 pencak silat regulations. The technical difference in playing, which is about pulling techniques, has resulted in the emergence of new types of takedown techniques. Takedowns are performed within five seconds. In pencak silat regulations, there are two types of legal takedowns, namely direct takedowns and indirect takedowns [7] [8].

Based on the analysis of the types of pulling takedown techniques in pencak silat matches, several types of techniques that are often used were found. At the provincial level, technique 1 – a directly performed takedown technique, was the most used. At the national and international levels, technique 6 – a pulling and sweeping technique was the most used. The difference in the most frequent techniques at the provincial, national, and international levels is caused by the difference in the number of participants, the characteristics of the data subjects taken, and the impact on the research results. The number of match

subjects at the provincial level is higher than the number of subjects at the national and international levels. In terms of competitive characteristics, the data subjects at the national and international levels are higher. From the competition standards at the national and international levels, the competition is tighter, and the qualification standards are higher. So, athletes have better techniques and compete more intensely. Athletes competing at the national and international levels also have more mature preparations, better athlete resources, compared to athletes competing in all aspects at the provincial level. These quality differences resulted in differences in the most frequent results of technique variations at the provincial, national, and international levels. Then, in the total percentage results of all data subjects, there are three techniques that are most frequently used. From this, the researcher assumes that these techniques have high technical efficiency. Due to the process and regulations, these three techniques only provide a little room for opponents to counterattack.

In addition, the success factors of the technique are seen in the physical elements. Physical elements have a significant influence on pulling takedown techniques, especially strength and explosive power. Pulling takedown techniques are performed by athletes by holding each other, which causes muscle contractions to work with high resistance, so athletes must have good strength. In addition to strength, muscle contraction power with explosive power also occurs when pulling using the hands. Strength and explosive power are very important in all martial arts, especially in pencak silat, which is dominated by pulling and pushing when performing pulling takedown techniques. Strength also contributes greatly to endurance in managing fatigue and reducing the risk of injury [9]. Strength is very important in pencak silat, because in the condition of making contact with takedown techniques, athletes perform several combinations of movements that involve a series of bones and certain muscles [10].

In pulling takedown techniques, there is also a coordination factor because the movement of pulling takedown techniques involves a series of body frame movements and muscles simultaneously. A study by [11], explains that coordination is the ability of several muscles to work together to produce a certain movement, coordinated movement is a complex and complicated movement. The same applies to the eleven types of pulling takedown techniques that involve several coordinated sequences of body movements.

Pulling takedown techniques are often performed in situational conditions, meaning that this technique is often used according to the conditions of the athlete that allow the technique to be successfully performed. In performing pulling techniques, athletes must be able to read and find the opponent's condition when the stance is unbalanced. Athletes must make the right decision when performing pulling takedown techniques. Because if the pulling takedown technique fails or is hit by a counterattack from the opponent, then the athlete who manages to survive will get points. This is a challenge for athletes to truly master pulling takedown techniques and set playing strategies.

Referring to previous research on the analysis of determining factors for winning techniques in pencak silat matches, takedown techniques are difficult to perform even though takedown techniques have the highest achievement point value [12]. Therefore, athletes must be able to master pulling takedown techniques, so that when competing, mastery of the technique has been applied maturely, which will facilitate the application of tactics and strategies to achieve victory.

The results of this study are beneficial for athletes to know how takedown techniques are performed. The results of this study can provide information for pencak silat coaches as a reference for making training programs and learning pulling takedown techniques. Techniques in sports are also very important for a coach in determining the characteristics and references for designing physical conditioning training programs [3].

In addition, the results of this study can provide information and references for researchers who want to develop research in accordance with the topic of pulling takedown techniques. This study has obtained new scientific findings regarding variations in types of pulling takedown techniques, because there has been no research on the types of pulling takedown techniques in pencak silat matches.

The limitations of this study are that it did not observe the same number of videos, at the provincial level (156 videos), at the national level (96 videos), and at the international level (46 videos). This limitation was experienced by researchers due to limited access and availability of videos at all three levels.

IV. CONCLUSIONS

Takedowns are a fundamental part of competitive pencak silat techniques. This research identified eleven new scientific types of pulling takedowns. Overall quantitative data showed that three techniques were frequently used: Technique 6 – pulling, grabbing, and sweeping (25.61%), Technique 3 – pulling and scissoring (19.35%), and Technique 5 – pulling and side takedown hook (18.77%).

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Impact of Religious Fasting on Resting Blood Pressure and Hydrogen Sulfide Bioavailability in High-Normal Blood Pressure Population

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Abstract | Hydrogen sulfide (H2S) has emerged as a critical gasotransmitter with significant roles in blood pressure (BP) regulation and cardiovascular health. Despite growing evidence from pre-clinical studies highlighting the vasodilatory effects of H2S, its role during fasting in humans remains unexplored. This study tested the hypothesis that religious fasting during Ramadan would reduce resting BP and enhance H2S bioavailability in individuals with high-normal BP. We examined the effects of a month-long fasting regimen on systolic BP and plasma H2S levels in fourteen adult Muslim men with high-normal BP (systolic BP 130-139 mmHg, diastolic BP 85-89 mmHg; *mean* ± *SD*: age 32 ± 5 years, body mass 85 ± 4 kg, height 1.7 ± 0.08 m). Baseline tests were conducted before fasting, followed by assessments on Day-1, Day-14, and Day-28 at two fasting durations (5 hours and 10 hours). The results demonstrated a significant reduction in systolic BP at the 10-hour fasting duration on Day-14 (mean decrease of 8.5 ± 3.2 mmHg) and Day-28 (mean decrease of 10.2 ± 3.8 mmHg) compared to baseline ($p < 0.05$). Additionally, plasma total H2S concentrations increased significantly on Day-7 (mean increase of 15.3 ± 4.1 µM) and Day-28 (mean increase of 17.8 ± 4.5 µM) compared to baseline and Day-1 ($p < 0.05$). These findings suggest that religious fasting can effectively lower BP and increase H2S bioavailability, providing a non-pharmacological approach to managing BP in high-normal BP populations

Keywords: *Fasting, blood pressure, hydrogen sulfide, gasotransmitter, cardiovascular health.*

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I. INTRODUCTION

Hydrogen sulfide (H_2S) plays a critical role in regulating blood pressure (BP) through its vasodilatory effects [1]. Despite pre-clinical evidence [2], the impact of H_2S during fasting in humans remains unexplored. This study examines how religious fasting during Ramadan affects resting BP and H_2S bioavailability in individuals with high-normal BP, providing potential non-pharmacological management strategies.

II. METHODS

Fourteen Muslim men with high-normal BP (*mean* ± *SD*: age 32 ± 5 years, body mass 85 ± 4 kg, height 1.7 ± 0.08 cm) voluntarily participated in this study. Baseline tests were conducted pre-fasting, followed by assessments on Day-1, Day-14, and Day-28 at 5 and 10-hour fasting durations. The resting BP was measured [3], and H_2S pools were measured using the monobromobimane method [4].

III. RESULTS AND DISCUSSION

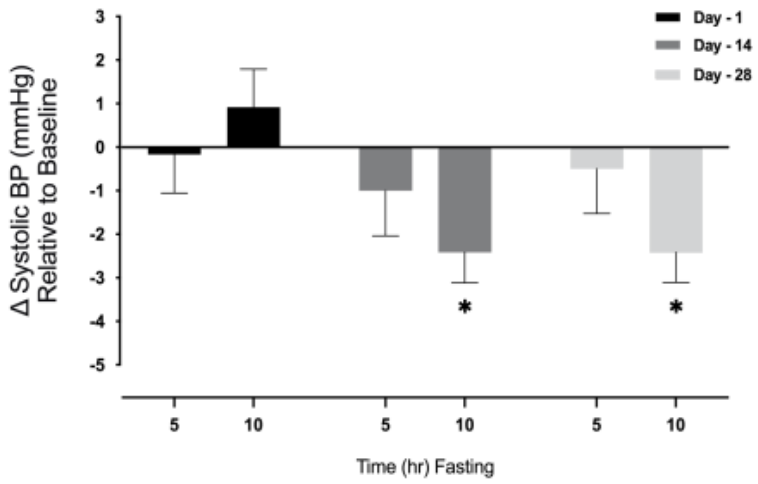

Fig. 1. Changes (Δ) in systolic BP relative to baseline at different fasting durations (5-hour and 10-hour) and different days (Day-1, Day-14, and Day-28).

Religious fasting significantly reduced systolic blood pressure (BP) by 8.5 ± 3.2 mmHg on Day-14 and 10.2 ± 3.8 mmHg on Day-28 at the 10-hour fasting duration ($p < 0.05$, Fig. 1). Plasma total H_2S concentrations increased by 15.3 ± 4.1 µM on Day-7 and 17.8 ± 4.5 µM on Day-28 ($p < 0.05$, Table 1). The results support the previous study by [5], demonstrating that long-term fasting activity significantly reduces systolic BP. Additionally, the study's findings are consistent with [6], who reported an increase in H_2S bioavailability with calorie restriction.

TABLE 1
PLASMA (FREE H_2S), PLASMA (ACID LABILE SULFIDE), PLASMA (BOUND SULFANE SULFUR) AND PLASMA (TOTAL H_2S) AT DIFFERENT TIME POINTS AT BASELINE (PRE-FASTING), AND FOLLOWING FASTING AT DAY-1, DAY-7 AND DAY-28.

		Baseline	**Day-1**	**Day-14**	**Day-28**
Plasma [free H_2S], µM	5-h	6.85 ± 1.01	6.80 ± 1.57	6.33 ± 1.40	6.59 ± 1.62
	10-h	6.63 ± 1.04	6.53 ± 1.26	6.18 ± 1.33	6.29 ± 1.46
Plasma [acid labile sulfide], µM	5-h	4.56 ± 1.07	4.96 ± 1.03	5.50 ± 0.63	6.00 ± 0.71
	10-h	4.63 ± 1.20	5.25 ± 0.93	5.79 ± 0.92	6.15 ± 0.83
Plasma [bound sulfane sulfur], µM	5-h	3.02 ± 1.21	3.14 ± 0.75	3.70 ± 0.82	3.77 ± 0.63
	10-h	3.29 ± 1.56	3.16 ± 0.95	3.61 ± 0.43	3.88 ± 0.74
Plasma [total H_2S], µM	5-h	14.43 ± 1.49	14.91 ± 1.29†	15.53 ± 1.16†*	16.36 ± 1.74†*
	10-h	14.54 ± 1.33	14.94 ± 1.31†	15.57 ± 0.82†	16.32 ± 1.42†*

** Significantly different from baseline. † Significantly different from Day-1.*

IV. CONCLUSIONS

The study suggests that religious fasting can significantly reduce systolic BP in individuals with high-normal BP, potentially through increased H_2S bioavailability, offering a non-pharmacological approach to managing BP.

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Incorporating Outdoor Recreational Activities into Fitness Routine Among University's Students

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Abstract | This research investigated incorporating outdoor recreational activities into fitness routines among Physical and Health Education (PHE) students in Universiti Teknologi MARA (UiTM) Kampus Puncak Alam, which focuses on both physical fitness and mental well-being. The research examines how different outdoor recreational activities might improve students' general health and tackles the rising demand for motivating and efficient exercise solutions nowadays. The research integrated a quantitative questionnaire to collect extensive data on students' engagement in physical activities such as walking, hiking, running, jogging, and swimming as well as their perceived benefits. The research found that walking, hiking, running, jogging, and swimming were the most beneficial outdoor recreational activities for both male and female students in terms of both physical and emotional well-being. The chi-square test results based on p-values show that there were significant associations between gender and participation in outdoor recreational activities in swimming ($p < 0.05$), day hiking ($p < 0.05$), running ($p < 0.05$), kayaking ($p < 0.05$), and jogging ($p < 0.05$). The ANOVA result shows the F and p values for feeling useful ($F = 3.62$, $p = 0.01$), feeling relaxed ($F = 4.45$, $p = 0.00$), feeling energetic ($F = 2.83$, $p = 0.04$), problem-solving ($F = 3.66$, $p = 0.01$), clear-thinking ($F = 4.98$, $p = 0.00$), self-esteem ($F = 2.86$, $p = 0.04$), feeling loved ($F = 2.96$, $p = 0.03$), interested in new things ($F = 2.78$, $p = 0.04$), cheerful ($F = 3.76$, $p = 0.01$), and feeling confident ($F = 3.48$, $p = 0.01$) indicate the significant different based on gender. These outdoor recreational activities show the strongest evidence of gender influence on participation rates. The students of both genders loved these activities, which have significant beneficial effects on their health and high engagement rates. The data also revealed preferences that are particular to gender, with men preferring to hike (86.4%) and jog (86.4%) and women also more likely to hike (92.9%) and jog (95.2%). The research has a wide range of implications, but one of its main points is that to create a supportive atmosphere that supports both physical and mental well-being, outdoor recreational activities should be incorporated into university wellness programs. Establishing and maintaining outdoor learning spaces and integrating them into the curriculum were recommended actions for educational institutions to improve the overall health of their students. These results show a solid basis for further study and program creation, and they were consistent with current literature emphasizing the mental well-being advantages of outdoor recreational activities. Hence, this research concludes that outdoor recreational activities at UiTM Kampus Puncak Alam were essential for improving the physical and mental health of students. University may foster a more comprehensive and health-conscious learning environment by adding these activities into physical fitness, which will eventually benefit students' general well-being and academic performance.

Keywords: *Outdoor recreational activities, physical fitness, mental well-being.*

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I. INTRODUCTION

Maintaining a healthy way of life is critical in today's fast-paced and sedentary lifestyle. Regular exercise benefits not just physical fitness but also mental health, stress reduction, and general quality of life [1]. As a result, universities were promoting students' physical fitness and mental well-being in addition to academic achievement. One interesting approach was to incorporate outdoor recreational activities into students' physical fitness and to examine the impact of outdoor recreational activities on both students' genders. Outdoor recreation includes participating in activities in nature that improve the mind, body, and soul. Hiking, biking, fishing, kayaking, and camping are some examples of outdoor activities. There were three types of outdoor recreation. Firstly, competitive activities like orienteering or team building. Besides that, there are educational activities like researching old-growth forests. Lastly, there are non-physical activities like appreciating nature alone or in groups [2]. Fitness routines should have five components to promote excellent health, such as aerobic fitness, weight training, core exercises, balance training, and flexibility [3]. The entire approach guarantees a well-rounded growth in physical fitness. Outdoor recreational activities have several advantages for both physical and mental well-being. Regular participation in outdoor activities has been related to greater mood, lower stress, and higher psychological well-being. These activities help students live a better, more balanced lifestyle. In addition to physical and mental well-being, outdoor recreational activities provide an enjoyable environment of community and social interaction among students. Participating in group activities such as team sports, hiking, or outdoor fitness lessons benefits not just physical health but also connections with others and friendships. This social component could improve motivation and commitment to physical fitness, making it more fun and sustainable over time.

II. METHODS

This research will be using a quantitative research design for this research. In the quantitative research design, the questionnaire method is being used to collect data from the respondents. The researcher is focusing on the students who are from UiTM Kampus Puncak Alam, Selangor. The reason why choosing students from UiTM Kampus Puncak Alam is because it is easy to find the students who live at the residential college that can help with this research and to know how much they know about using outdoor recreation activities in physical fitness. The total population size (N) is estimated based on overall students in UiTM Kampus Puncak Alam and the overalled population are 140 students. This research will use the Krejcie and Morgan (1970) sampling method to estimate the sample size of the respondents. The population size (N) for this research are 140 students and the sample size (S) are 100 students. This research will use a stratified random sample procedure to guarantee that both male and female students from various faculties at Universiti Teknologi MARA are fairly represented.

A set of questionnaires intended to collect information on students' engagement in outdoor recreational activities and their mental well-being was the main research tool utilized in this research. The Outdoor Recreation Participation Scale 1, The Physical Activity Questionnaire for Older Children (PAQ-C) and Adolescents (PAQ-A) Manual, The Exercise Motivations Inventory – 2 (EMI-2), Warwick-Edinburgh Mental Well-being Scale (WEMWBS) were being adopted to build the questions for this research. A pilot test with 30 students was used for pre-testing to improve the questions' reliability and clarity The data collection will be done by obtaining Research Ethics Approval from Faculty of Education

and gathering all the information from the respondents. The SPSS statistical software will be used to summarize all the data from the questionnaire.

The acquired data was analysed using both descriptive and inferential statistics. Descriptive analysis presented numerical data on demographic features, participation, frequencies, duration, perceived benefits, cross-tabulations, correlation, and regression that enabled the discovery of trends and patterns. Inferential statistics were employed to test hypotheses and examine correlations between variables. These studies identified significant variables for improvement and provided important new insights into the characteristics in incorporating outdoor recreational activities into fitness routine and mental well-being. The methodology of the study was meticulously planned to guarantee the authenticity and trustworthiness of the data, therefore providing strong findings and practical suggestions. The results will guide initiatives to support outdoor recreational activities and improve their fitness routine and mental well-being of students at UiTM Puncak Alam, fostering a more positive and healthy campus community.

III. RESULTS AND DISCUSSION

TABLE I
DESCRIPTIVE ANALYSIS ON PARTICIPATION, FREQUENCY, DURATION, PERCEIVED BENEFITS IN OUTDOOR RECREATIONAL ACTIVITIES AND CROSS TABULATION OF GENDER AND PARTICIPATION IN OUTDOOR RECREATIONAL ACTIVITIES

Category	Activity	Answer	Frequency (n)	Percent (%)
Participation in Outdoor Recreational Activities	Jogging	No	10	9.9%
		Yes	91	90.1%
	Hiking	No	11	10.0%
		Yes	90	89.1%
Frequency in Outdoor Recreational Activities	Walking	No	4	4.0
		1-2 times	8	7.9
		3-4 times	25	24.8
		5-6 times	25	24.8
		7 times or more	39	38.6
	Jogging	No	4	4.0
		1-2 times	8	7.9
		3-4 times	25	24.8
		5-6 times	25	24.8
		7 times or more	39	38.6
Duration in Outdoor Recreational Activities	Walking	None	4	4.0
		1-2 days	8	7.9
		3-4 days	25	24.8
		5-6 days	25	24.8
		7 days and above	39	38.6
	Jogging	None	12	11.9
		1-2 days	40	39.6
		3-4 days	25	24.8
		5-6 days	16	15.8
		7 days and above	8	7.9
Perceived Benefits in Outdoor Recreational Activities	To stay/become more agile when doing physical exercise	Not very true for me	2	2.0
		Not true for me	6	5.9
		I don't know	0	0.0
		True for me	63	62.4
		Very true for me	30	29.7

	To build up my muscle strength and endurance	Not very true for me	2	2.0
		Not true for me	12	11.9
		I don't know	0	0.0
		True for me	61	60.4
		Very true for me	26	25.7
Cross Tabulation of Gender and Participation in Outdoor Recreational Activities	Biking	No	27.1%	33.3%
		Yes	72.9%	66.7%
	Day Hiking	No	32.2%	33.3%
		Yes	67.8%	66.7%

Most students at UiTM Puncak Alam were highly engaged in outdoor activities, with 90.1% enjoying jogging and 89.1% preferring hiking. Remarkably, 38.6% make walking and jogging a daily habit, and many appreciate these activities for keeping them agile (62.4%) and building muscle strength (60.4%). Meanwhile, for cross tabulation the data shows that biking was more popular among male students (72.9%), while day hiking attracts both males and females almost equally, showing shared enthusiasm for outdoor recreational activities.

TABLE II
CORRELATION ANALYSIS BETWEEN OUTDOOR RECREATIONAL ACTIVITIES AND MENTAL WELL-BEING ASPECT

Mental Well-Being Aspect	**Activity**	**Correlation I**	***p*-value**
Feeling Loved Around People	Running	0.31	0.002
Thinking Clearly	Jogging	0.289	0.003

Running was closely linked to feeling loved and connected (r = 0.31), while jogging significantly boosts clear thinking (r = 0.289), highlighting the emotional and cognitive benefits of these outdoor recreational activities.

TABLE III
REGRESSION ANALYSIS FOR MODEL SUMMARY

Model Summary	***R***	***R* Square**	**Adjusted R Square**
Feeling Relaxed	0.317	0.101	0.073
Interest in Other People	0.348	0.121	0.094

Engaging in outdoor activities like jogging and biking not only helps students relax (R = 0.317) but also fosters a greater interest in social interactions (R = 0.348).

TABLE IV
REGRESSION TABLE FOR ANOVA

ANOVA	**Sum of Squares**	***df***	**Mean Square**	**F**	**Sig.**
Feeling Relaxed	9.496	3	3.165	3.621	0.016
Interest in Other People	9.995	3	3.332	4.447	0.006

Physical activities significantly contribute to students feeling relaxed (p = 0.016) and more interested in others (p = 0.006), underscoring the profound social and emotional impacts of outdoor recreational activities.

TABLE V
REGRESSION ANALYSIS FOR COEFICIENTS

Coefficients	**Activity**	**Beta**	***t***	**Sig.**
Feeling Relaxed	Jogging	0.368	2.259	0.026
Interest in Other People	Bicycling	0.211	2.072	0.041

Jogging stands out as a key activity for relaxation (*Beta* = 0.368), while biking enhances social engagement (*Beta* = 0.211), making these activities crucial for mental well-being.

IV. CONCLUSIONS

This research has shown the substantial advantages of outdoor recreational activity pursuits on students' mental well-being at Universiti Teknologi MARA Kampus Puncak Alam, including walking, hiking, running, and swimming. The results validate the benefits of exposure to natural surroundings for mental well-being, supporting established hypotheses such as the Attention Restoration Theory and the Biophilia Hypothesis. The necessity for educational institutions to give priority to the construction of outdoor recreational facilities and include these outdoor recreational activities in wellness programs is highlighted by the study's significant statistical correlations and practical consequences. Universities may greatly enhance their students' physical fitness routine and mental well-being by creating a supportive atmosphere that promotes regular engagement in outdoor recreational activities.

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Independent and Synergistic Impact of Mouth Rinsing with L-Menthol, Carbohydrate, Caffeine, and Combination L-Menthol + Carbohydrate + Caffeine on Intermittent Performance in Recreationally Active Young Men

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Abstract | This study examined the hypothesis that mouth rinsing with carbohydrate (CHO), caffeine (CAF), L-menthol (MEN), and their combination (CHO+CAF+MEN; MIX) would improve performance during high-intensity intermittent exercise. Eighteen recreationally active young men (*mean* ± *SD*: age 22 ± 2 years, body mass 62 ± 7 kg, height 168 ± 0.06 cm) participated in a randomized, double-blind, placebo-controlled crossover study. Participants completed six trials involving mouth rinsing with CHO, CAF, MEN, MIX, a placebo (PLA), and a control (CON; plain water). The CHO mouth rinse (1440 ± 288 m) significantly enhanced exercise performance in the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) test compared to PLA (1383 ± 282 m) and CON (1373 ± 282 m) (both $p < 0.05$), but not when compared to other rinses. There were no significant differences in heart rate (HR), muscle oxygenation (SmO2), blood lactate, or blood glucose levels between the different mouth rinse conditions. These results suggest that CHO mouth rinsing can improve intermittent exercise performance without affecting physiological markers such as HR, SmO2, lactate, or glucose. Further research should explore the mechanisms behind these performance improvement effects and the potential benefits for different athletic populations.

Keywords: *Mouth rinsing, carbohydrate, caffeine, L-menthol, muscle oxygenation, blood glucose.*

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I. INTRODUCTION

Mouth rinsing with carbohydrate (CHO) [1], caffeine (CAF) [2], or L-menthol (MEN) [3] solutions may improve exercise performance. However, the combined effects on high-intensity intermittent exercise are not fully understood. This study examines the separate and combined impacts of CHO, CAF, MEN, and CHO+CAF+MEN mouth rinses on performance, muscle oxygenation, and metabolic indicators during high-intensity intermittent exercise.

II. METHODS

Eighteen recreationally active young men (22 ± 2 yrs; 58 ± 7 kg; 170 ± 0.06 cm) participated in a randomized, double-blind, placebo-controlled crossover study. Participants underwent six tests with different mouth rinse conditions (CHO, CAF, MEN, CHO+CAF+MEN, PLA, and CON) and a 5-day washout period. Performance was measured using the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) [4], muscle oxygenation (SmO2) with the MOXY Muscle Oxygen Monitor [5], and blood glucose [6] and blood lactate [7] levels were recorded.

III. RESULTS AND DISCUSSION

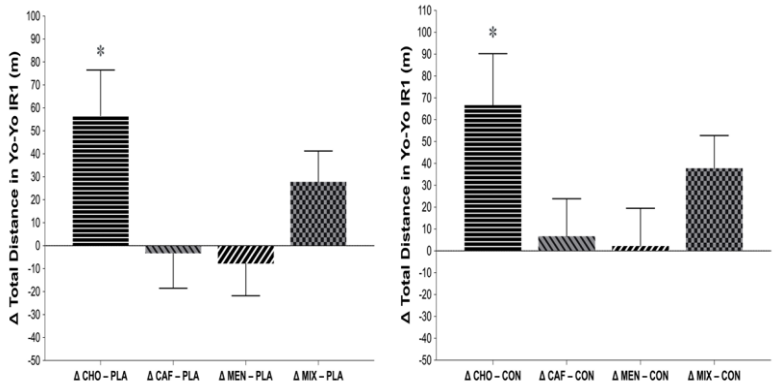

Fig. 1 Change Δ in total distance covered in the Yo-Yo IR1 test compared to placebo (PLA) and control (CON) (mean ± SEM).

CHO mouth rinsing significantly improved performance in the Yo-Yo IR1 test compared to PLA and CON ($p < 0.05$, Fig. 1). No significant differences were found in SmO_2% (Fig. 2). The analysis also revealed significant increases in blood lactate with exercise intensity, but there were no significant differences between mouth rinse conditions ($p > 0.05$). Notably, there is a trend of higher glucose levels in the CHO and CHO+CAF+MEN conditions, though these differences were also not statistically significant ($p = 0.95$).

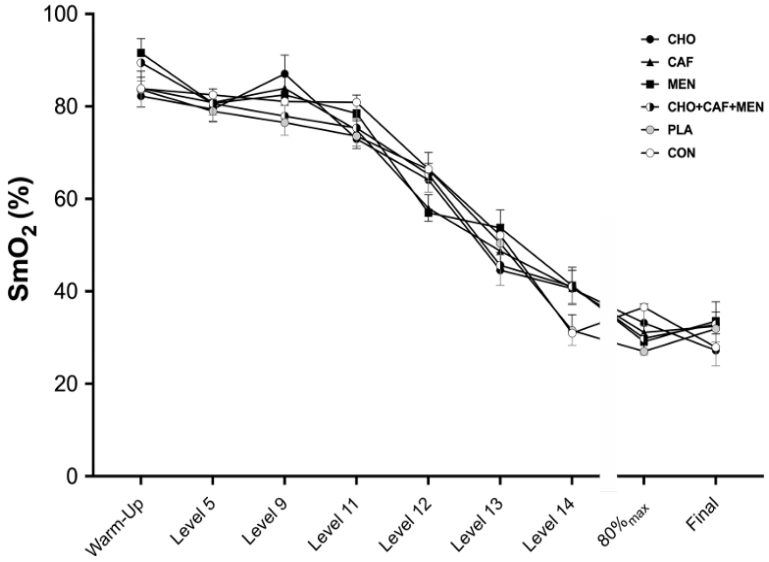

Fig. 2 Change Δ muscle oxygenation during Yo-Yo IR1. (mean ± SD)

The results support the previous study by [1], demonstrating that CHO enhances high intensity interval exercise. Accordingly, previous studies also suggest that CHO mouth rinse could attenuate the decrease in blood glucose during exercise [7] [8].

IV. CONCLUSIONS

CHO mouth rinses may enhance exercise performance, though the exact mechanism remains unclear in this research. Future research should investigate the underlying mechanism, as well as the long-term effects and potential benefits across different athletic populations and exercise types.

ACKNOWLEDGMENT: We would like to thank all participants for their time and effort in this study.

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Investigation on Effective Communication and Group Cohesiveness in the Outdoor Recreation Program Curriculum at the Faculty of Sports Science and Recreation, UiTM

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Abstract | This research endeavour seeks to compare the difference between level of education on effective communication and group cohesiveness through outdoor recreation program curriculum at the faculty of sports science and recreation, UiTM. The study delves into two fundamental components of effective communication: external perception encompassing clarity and information dissemination, and internal disseverance focusing on conflict resolution. In addition, the analysis of group cohesiveness entails an examination of four dimensions: individual attractions towards the group in social contexts (ATG-S), individual attractions towards the group in task-oriented settings (ATG- T), group integration-social (GI-S) and group integration-task (GI-T). A set of questionnaires based on Interpersonal Communication Skills (ICS) and Group Environment Questionnaire (GEQ) was completed by 233 students who took an outdoor recreation program. The respondent in this study consists of male (n = 121) and female (n = 112) respondents. The result revealed that external perception is positively associated with group integration social (GI-S) but negatively associated with individual attraction to the group task (ATG- T). Internal disseverance is positively associated with individual attraction to the group social (ATG-S), group integration social (GI-S) and group integration task (GI-T). Conversely, negatively associated with individual attraction to the group task (ATG-T). The findings underscore the complex interplay between external factors (such as perception) and internal group dynamics (such as conflict management) in shaping overall group cohesiveness and member engagement. These findings could help students and academicians understand the elements of group cohesiveness which can lead to more effective group work and improved learning experience for better educational achievement.

Keywords: *Effective communication, group cohesiveness, outdoor recreation program, curriculum development.*

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I. INTRODUCTION

Outdoor recreation program curriculum is a type of training that promotes every aspect of an individual, including intellectual, physical, emotional, social, and psychological health. This educational technique attempts to provide students with practical knowledge and skills in natural environments, frequently using outdoor leisure activities to achieve academic goals [1]. Besides, internal and external influences contributed to development. Changes must be made with a structured and systematic approach so that the transformation process can be observed and is consistent with expectations [2]. Through communication, one can better understand themselves, their peers, and the world around them. This is because communication allows one to learn about their environment and respond correctly by acting and choosing appropriately [3]. When it comes to altering attitudes, beliefs, behaviors, and perceptions, interpersonal communication is the most successful form of communication.

Moreover, according to study conducted by [4], cohesion is a dynamic process that is reflected in a group tendency to keep together and remain together in the achievement of its instrumental purposes and for the satisfaction of member affective needs. Individual and societal demands pushed for unity. Because of this urgency, group members were able to connect with one another on a constant basis, which fostered cooperation and, ultimately, group cohesion [5]. This research endeavour seeks to compare the difference between level of education on effective communication and group cohesiveness through outdoor recreation program curriculum at the faculty of sports science and recreation, UiTM. The study delves into two fundamental components of effective communication: external perception, which encompasses clarity and information dissemination, and internal disseverance, which focuses on conflict resolution. In addition, the analysis of group cohesiveness entails an examination of four dimensions: individual attractions towards the group in social contexts (ATG-S), individual attractions towards the group in task-oriented settings (ATG- T), group integration-social (GI-S) and group integration-task (GI-T).

II. METHODS

A quantitative research and questionnaire survey are chosen as the primary research design. A set of questionnaires based on Interpersonal Communication Skills (ICS) and Group Environment Questionnaire (GEQ) was completed by 233 students who took an outdoor recreation program. The respondents in this study consist of male (n = 121) and female (n = 112) respondents. The respondents for this study will be the students from Universiti Teknologi Mara Campus Perlis, Seremban, Shah Alam, Puncak Alam, and Jengka. Samples are selected using the purposive sampling method.

III. RESULTS AND DISCUSSION

An independent sample t-test was conducted to compare the differences between levels of education on effective communication and group cohesiveness.

TABLE I
AN INDEPENDENT SAMPLE T-TEST TO ASSESS THE DIFFERENCE BETWEEN LEVEL OF EDUCATION ON THE EFFECTIVE COMMUNICATION AND GROUP COHESIVENESS

	Group Statistic				
	Level of Education	***N***	***Mean***	***Std. Deviation***	***Std. Error Mean***
EP	Bachelor Degree	111	5.3964	1.12688	0.10696
	Diploma	122	5.5184	1.00575	0.09106
ID	Bachelor Degree	111	5.8889	0.97373	0.09242
	Diploma	122	5.7268	1.04536	0.09464
ATG-S	Bachelor Degree	111	4.9892	1.45423	0.13803
	Diploma	122	4.9361	1.40372	0.12709
ATG-T	Bachelor Degree	111	3.3896	1.50404	0.14276
	Diploma	122	3.7029	1.45821	0.13202
GIS	Bachelor Degree	111	6.4640	2.09541	0.19889
	Diploma	122	6.4672	1.89250	0.17134
GIT	Bachelor Degree	111	5.2309	1.63565	0.15595
	Diploma	122	5.1492	1.55549	0.14083

The analysis of effective communication and group cohesiveness across different educational levels (diploma and bachelors degrees) reveals no significant differences in the measured subscales. The results from Levene's Test consistently indicated equal variances across the groups, supporting the assumption required for the subsequent t-tests. External Perception: No significant difference in effective communication subscale for external perception with the mean score for bachelor degree, M = 5.40, SD = 1.13, was lower than diploma level, M = 5.52, SD = 1.01 (t (231) = -0.87, p = 0.321) confirm that this difference is not statistically significant, leading us to retain the null hypothesis (H0). Internal Disseverance: Similarly, the scores for internal disseverance showed no significant difference, t (231) = 1.221, p = 0.223 (two-tailed) in the scores with a mean score for diploma level, M = 5.73, SD = 1.05, was lower than bachelor degree, M = 5.90, SD = 1.01, and t (231) = -0.874, p = 0.383 (two-tailed). Consequently, there is no significant difference in effective communication subscale between level of education.

Individual Attraction to the Group (Social and Task): For both the social (ATG-S) and task (ATG-T) subscales, the results indicated no significant differences. The ATG-S scores were M = 4.92, SD = 1.40, for diploma level and M = 4.99, SD = 1.45, for bachelor degree (t (231) = 0.284, p = 0.777). The ATG-T scores also showed no significant difference, with diploma level scoring M = 3.70, SD = 1.46, compared to M = 3.39, SD = 1.50, for bachelor degree (t (231) = -1.613, p = 0.108). Group Integration (Social and Task): The analysis for both group integration subscales also yielded non-significant results. For GI-S, the scores were M = 6.46, SD = 1.89, for diploma and M = 6.47, SD= 2.10, for bachelor degree (t (231) = -0.012, p = 0.990). For GI-T, diploma holders scored M = 5.15, SD = 1.56, compared to M = 5.23, SD = 1.64, for bachelor degree (t (231) = 0.390, p= 0.697).

The study findings show that an individual's level of education has no impact on their communication skills. This rejects the generally accepted view that greater education levels are connected with better communication abilities. Besides, it highlights the need for a more individualized approach to

communication skill development, focusing on personal strengths and weaknesses rather than relying solely on educational attainment.

IV. CONCLUSIONS

In summary, the findings indicate that the level of education (diploma and bachelor degree) does not significantly impact effective communication or group cohesiveness as measured by the various subscales. This suggests that both educational groups may possess similar capabilities in these areas, which could have implications for educational institutions and training programs. Future research could explore other factors that may influence effective communication and group cohesiveness beyond educational attainment.

ACKNOWLEDGMENT: We would like to express our heartfelt gratitude to all those who contributed to the successful completion of this research study. First and foremost, we extend our sincere appreciation to our research participants, whose willingness to share their experiences and insights made this study possible. Your contributions were invaluable and provided the foundation for our findings.

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Manchester City's Premier League Dominance: Longitudinal Study for 2021-2023

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Abstract | This study investigates the factors contributing to Manchester City Football Club's sustained dominance in the Premier League between the 2020/21, 2021/22 and 2022/23 seasons. Employing a longitudinal research design, the study examines the interplay between tactical details and the effect of player changing towards tactical details in Manchester City throughout the 2020/21, 2021/22 and 2022/23 seasons. Key areas of analysis include Guardiola's tactical philosophy, player recruitment and development, and the impact of player change. The sample size in this study was 114 matches ($N = 114$) of the English Premier League, and it was divided into three seasons, which are 2020/21, 2021/22 and 2022/23. Furthermore, the methodology used was notational analysis and secondary data. The data is collected from Premier League Official Apps. Besides, based on analysis conducted by Kruskal-Wallis, the findings showed there are significant differences in terms of the shot-off target ($X^2 = 8.33$, $p = 0.016$). The other variables show there is no significant difference in data and the p-value > 0.05. For successful passing ($X^2 = 2.75$, $p = 0.253$), for unsuccessful passing ($X^2 = 5.79$, $p = 0.055$), for shot on target ($X^2 = 1.64$, $p = 0.440$), and for scoring ($X^2 = 1.15$, $p = 0.564$). Moreover, the present study revealed that the significant difference was only found in shots off-target. Other than this, the variables show that there are no significant differences. This is because the effectiveness of a team's attacking force in scoring goals is largely determined by its formation, player characteristics, and shooting abilities. Other than that, this team's style of play emphasizes precise ball possession and methodical attacks, a formula that has been instrumental in their domestic and European triumphs. In conclusion, there is a significant difference in the shot-off target. But there is no significant difference in successful passing, unsuccessful passing, shot on target, and scoring.

Keywords: *Possession football, Manchester City, premier league, notational analysis, tactical detail.*

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I. INTRODUCTION

Football is a unique sport because it requires very good strategy or tactics to defeat the opponent. After over 100 years, football has been introduced. A continuing evolution of the football game involves the need for continuous identification, registration and evaluation of players' game actions [1]. It has various tactics that have developed, such as possession football, direct football, and counter-attacking football [2]. The present study undertakes a critical analysis of Manchester City's 2020/21, 2021/22 and 2022/23 Premier League victory journeys, analysing the crucial elements that facilitated their success, such as team dynamics, managerial choices, and the competitive environment. In the present day, performance analysis involves the use of match statistics and the latest technology to improve athletes' performance [3]. Through an analysis of the variances of their achievements, this research o'fers insightful information about the dynamics of successful football management and provides inspiration for teams and clubs hoping to achieve a level of success. After all, many football teams and national football teams use various technologies to explore the tactical features to develop the best strategies for their teams [4].

II. METHODS

The research utilises a specific sampling technique known as "purposive sampling" to choose matches for analysis. The data will be collected through a total of 114 official matches ($N = 114$) played by Manchester City in the English Premier League 2020/21, 2021/22 and 2022/23 seasons. All the match statistics were taken from https://www.premierleague.com/pl-app. Notational analysis of matches includes manually coding specific events or actions that appear in the match statistics. Using the research question as a guide, this approach concentrates on collecting important performance indicators.

III. RESULTS AND DISCUSSION

The Kolmogorov-Smirnov test indicates that the data was not normally distributed, as shots of the target between 2020/21, 2021/22, and 2022/23 have a significant value of $p < 0.05$. As defined here, kurtosis cannot be less than 1.00. Probability models with kurtosis values between 1.00 and 3.00 are light-tailed distributions. Probability models with kurtosis values more than 3.00 are considered to be heavy-tailed distributions [3]. As a result, the data were analysed using a non-parametric Kruskal-Wallis test.

The present study found that one tactical detail showed significant differences between Manchester City's 2020/21, 2021/22 and 2022/23 seasons. However, four tactical details did not show significant differences. These were successful passing, unsuccessful passing, shooting on target, and scoring. The *p*-value for these four tactical details was greater than 0.05, indicating no significant difference (Table 1).

The tactical detail that had a significant difference was shooting off target. Data showed that, shot off target recorded the highest mean and standard deviation during the 2020/21 season, with 5.09 ± 10.03. Nevertheless, 2021/22 had the lowest mean and standard deviation, with 3.72 ± 12.08. A Kruskal-Wallis test revealed a statistically significant difference in the playstyle of Manchester City between seasons 2020/21, 2021/22 and 2022/23 and no significant difference in the playstyle of Manchester City with different players between seasons 2021-2023 (Season 21, $n = 38$: shot off target, Season 22, $n = 38$: shot off target, Season 23, $n = 38$: shot off target), $X2$ (2, $n = 114$) = 8.33, $p = 0.016$. The Shot off target (Season

2021/22) recorded a higher median score (*Md* = 12.00) than the other two seasons, with the 2020/21 season recording median values of 9.00 and the 2022/23 season recording a median value of 12.00.

TABLE I
INFERENTIAL ANALYSIS OUTPUT FOR INDICATORS

	X^2	*df*	*p*
Successful Passing	2.75	2	0.253
Unsuccess Passing	5.79	2	0.055
Shot on Target	1.64	2	0.440
Shot off Target	8.33	2	0.016
Scoring	1.15	2	0.564

Descriptive statistics like mean, minimum, maximum, and standard deviation were used to present the collected data (Figure 1). The graph below shows the mean for each variable measured in this study for Manchester City between 2020/21, 2021/22 and 2022/23 seasons. The red graph represents successful passing, the green graph represents unsuccessful passing, the pink graph represents a shot on target, the yellow graph represents a shot off target, and the blue graph represents scoring.

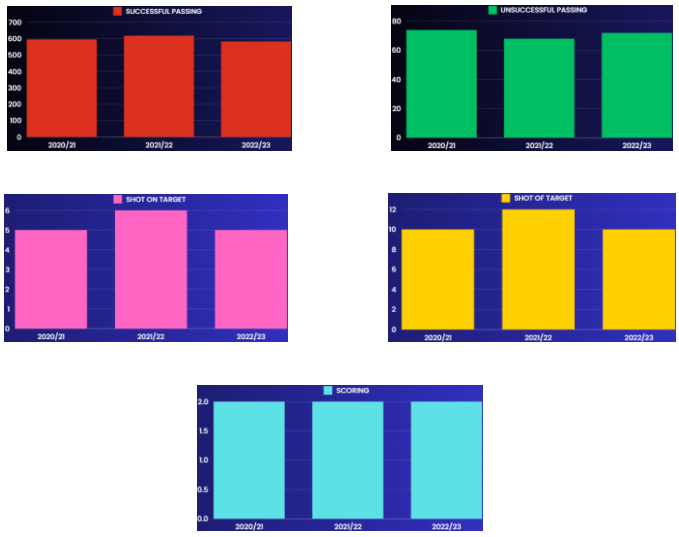

Fig. 1 Mean value for Manchester City indicators between 2020/21, 2021/22 and the 2022/23 Season.

IV. CONCLUSIONS

To sum up, the present study noticed that there is only one variable that shows significant difference, which is shot off target. Other than that, such as successful passing, unsuccessful passing, shots on target and scoring, there is no significant difference.

ACKNOWLEDGMENT: We would like to express our sincere gratitude to all members of the research team for their invaluable contributions to this study. Your dedication, expertise, and collaborative spirit were instrumental in the successful completion of this research.

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Physical Activity Participant: Engagement Toward Cognitive and Physical Function among Rural Veteran's Athletes

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Abstract | Engaging in physical activity is essential for preserving and enhancing cognitive and physical abilities, particularly for rural veteran athletes. Nevertheless, there is a dearth of research documenting the outcomes specifically for this age group. The study aimed to determine the relationship between physical activity, cognitive function, and physical function among rural veteran athletes. A cross-sectional correlational design was used. Data was collected using the Montreal Cognitive Assessment (MoCA), Sports Performance Physical Battery Test – Chair Stand Test (SPPB), Physical Activity Readiness Questionnaire for Everyone (PAR-Q+), and Community Health Activities Model Program for Seniors (CHAMPS). There is a significant moderately positive relationship (r = 0.460, p = 0.009) between physical activity for all activities and cognitive performance. Physical function showed a non-significant correlation (r = 0.346, p = 0.057) with physical activity for all activities. In conclusion, rural veteran athletes engage in a substantial amount of physical activity, meeting or exceeding recommended guidelines. There is a positive relationship between physical activity levels and cognitive function, indicating that higher physical activity is associated with better mental health. The relationship between physical activity and physical function is weak, suggesting that while physical activity.

Keywords: *Physical function, cognitive function, physical activity, Montreal Cognitive Assessment (MoCA), Sport Performance Physical Battery Test (SPPB), Community Health Activities Model Program for Seniors (CHAMPS).*

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I. INTRODUCTION

Engagement in physical activity is a crucial aspect of maintaining and improving both cognitive and physical functions, particularly among rural veteran's athletes [4]. The unique challenges faced by this population, including limited access to resources and healthcare facilities, make it essential to understand the specific impact of physical activity on their overall well-being [5]. To address this, it is important to delve deeper into the cognitive and physical benefits that can be gained through regular participation in physical activity, and to explore how these benefits can be maximized for rural veteran's athletes [6]. Physical activity has been demonstrated to have significant effects on cognitive and physical functions, notably among rural veteran athletes [7]. The constraints that this group faces, such as limited resources and access to healthcare facilities, necessitate a thorough understanding of the influence of physical activity on their overall well-being. It is crucial to investigate the mental and physical advantages of engaging in regular physical activity [6]. The primary objective of this research is to investigate the physical activity, cognitive function, and physical function among rural veteran athletes.

Some rural veterans may have physical disabilities or health conditions that limit their ability to be physically active. Despite the barriers, several things can be done to promote physical activity among rural veterans. These include developing and promoting community-based physical activity programs for veterans. Community-based physical activity programs can provide rural veterans with access to facilities and resources, as well as social support for physical activity. Educating rural veterans and their families about the benefits of physical activity can help motivate them to be more physically active. Providing support and encouragement to veterans to be physically active. Providing support and encouragement to rural veterans to be physically active can help them overcome barriers and achieve their physical activity goals. By promoting physical activity among rural veterans, we can help them improve their cognitive and physical function and live long, healthy lives.

II. METHODS

The correlational research design is used to determine if a relationship exists between variables. The sample for this study was among rural veteran's athletes, which was collected using non-probability sampling with an emphasis on purposive sampling. The sampling method was chosen because it has specific criterias which participants were veteran athletes who were 55 years old and older. The sample collected consisted of 31 respondents after considering the expected 20% dropout rate.

Data were collected using the Montreal Cognitive Assessment (MoCA), Sports Performance Physical Battery Test—Chair Stand Test (SPPB), Physical Activity Readiness Questionnaire for Everyone (PAR-Q+), and Community Health Activities Model Program for Seniors (CHAMPS). These include demographic profiles and the Physical Activity Readiness Questionnaire (Par-Q) to capture essential participant information, the Montreal Cognitive Assessment (MOCA) for cognitive function assessment, the Community Healthy Activities Model program for Seniors (CHAMPS) questionnaire to gauge physical activity levels, and the Short Physical Performance Battery, with a particular focus on the physical activity function of the Chair Stand Test.

III. Results and Discussion

Finding a link between the level of physical activity and cognitive performance in rural veteran athletes is the second research goal. Physical activity, considering all exercise-related activities, showed a high positive connection (0.460, $p < 0.01$) with cognitive function, which is consistent with previous research on the advantages of physical activity for cognitive health. The hypothesis that greater levels of general physical activity are linked to improved cognitive performance is supported by this finding. This result is consistent with findings from past study [1], who found that aerobic exercise training increased hippocampal volume in older adults, which was associated with improved memory function [1].

It is somewhat unexpected that there is only a very modest, non-significant negative connection (-0.004) between physical activity, considering moderate-intensity exercise, and cognitive performance. This finding raises the possibility that moderate-intensity exercise does not significantly affect cognitive performance on its own. This finding contrasts with some existing literature, such as a meta-analysis by Smith et al. [2], which found that aerobic exercise training was associated with modest improvements in attention and processing speed, executive function, and memory. However, it's important to note that our result is specifically about moderate-intensity exercise, while the meta-analysis looked at aerobic exercise more broadly. The difference between the non-significant correlation for moderate-intensity exercise and the strong positive correlation for overall exercise shows that overall physical activity may be more essential for cognitive function than exercise intensity. This aligns with research conducted [3], who found that total volume of physical activity, rather than intensity, was associated with lower mortality in older adults [3].
This study's final goal was to investigate the connection between physical function and physical activity in rural veteran athletes. The study concentrated on two main factors that related to scores on physical function: the number of calories spent on activities related to moderate-intensity exercise and the number of calories burned in all these activities per week. When the length of activities connected to moderate-intensity exercise was examined. This suggests that there is no significant correlation between the duration of moderate-intensity exercise-related activities and Short Physical Performance Battery test scores in this cohort. Despite the moderate link, the absence of statistical significance points to the need for caution in interpretation and for taking other factors that may influence physical function into account. This trend aligns with meta-analyses suggesting a positive impact of physical activity on functional capacity in older adults [2].

TABLE 1
THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND COGNITIVE FUNCTION AMONG RURAL VETERAN'S ATHLETES

Physical activity	**Cognitive Function**
Kilocalories expenditure/week in all exercise-related activities	0.460**
Kilocalories expenditure/week in moderate-intensity exercise-related all exercise	-0.004

*Note: **p < 0.01*

TABLE 2
THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND PHYSICAL FUNCTION AMONG RURAL VETERAN'S ATHLETES

Physical Activity	**Physical Function**
Kilocalories expenditure/week in all exercise-related activities	0.346*
Kilocalories expenditure/week in moderate-intensity exercise-related activities	0.049

*Note: *p < 0.05*

IV. CONCLUSIONS

In conclusion, Rural veteran athletes engage in a substantial amount of physical activity, meeting or exceeding recommended guidelines. There is a positive relationship between physical activity levels and cognitive function, indicating that higher physical activity is associated with better mental health. The relationship between physical activity and physical function is weak, suggesting that while physical activity benefits cognitive health, it does not necessarily ensure high physical function in older age.

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Positional Profiling Feasibility of U18 Ice-hockey Players Based on Anthropometry and Aerobic Capacity

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Abstract | Identification of talented players necessitates both subjective and objective evaluations of their playing ability and performance. Evaluating anthropometric characteristics and general physiological performance can aid sports professionals in player selection. This study aimed to determine if positional profiling is feasible for national-level ice hockey players by examining their anthropometric characteristics and physiological performance in two different seasons. The study included two U18 ice hockey teams from the "Székelyföldi" Ice Hockey Academy (SZJA). Data collection occurred in May 2020 and June 2023 at the SZJA's Medical and Methodological Center. Body height, including barefoot height, was measured using a wall-mounted stadiometer (± 0.1 cm accuracy), while body weight was recorded with a standard scale. A standard incremental maximal oxygen uptake test was conducted in the laboratory using open-circuit spirometry and computerised instrumentation (CPET Cosmed, Italy) following the Bruce protocol. Additionally, cortisol levels were measured by ELISA from saliva samples to assess the players' physical stress levels. Descriptive statistics revealed no significant differences in anthropometric characteristics between forwards and defensemen. However, some potential differences in maximal and absolute oxygen uptake rates were observed. Although descriptive statistics indicated no significant differences between the two positions, the Mann-Whitney U test, considering.

Keywords: *VO_2 max, Spiroergometry, cortisol, ice hockey, playing position*

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I. INTRODUCTION

In ice hockey, anthropometric data can help in talent identification [1] by distinguishing physical attributes that correlate with performance [2]-[4]. Specific characteristics can be associated with role-specific demands [5] [6], but there may be variations within positions [7]. Player profiling needs a series of additional factors, like skill level, tactical understanding, and psychological attributes, which can also correlate with cortisol levels [8] [9].

II. METHODS

This study involved two national-level U18 ice hockey teams: the U18 team from the year 2020 and the U18 team from the year 2023. 16 forward (F) players and 8 defensemen (D) for the 2020 team, and 16 forwards and 6 defensemen for the 2023 team were studied. Anthropometric data were collected to assess the physical characteristics of the participants. Height was measured using a wall-mounted stadiometer, weight was measured using a digital scale. Aerobic performance was assessed using the Quark CPET (Cosmed, Italy) device, a system designed for cardiopulmonary exercise testing. Salivary cortisol was determined by ELISA (IBL, Germany). Descriptive statistics and data visualisation was implemented in Microsoft excel. Spearman rank correlation (SPSS) was calculated to assess the relationships between variables.

III. RESULTS AND DISCUSSION

While no significant difference was observed in anthropometric characteristics between positions, we found moderate and strong correlations between pre-season and mid-season VO_2max and salivary cortisol levels in case of defensemen. The anthropometric characteristics and physiological performance data show no significant differences between forwards and defenders on either of the studied teams (ex. VO_2 max levels (ml/min/kg) U18 2020 Forwards 55.65 ± 5.29, Defensemen 52.39 ± 4.22. U18 2024 Forwards 53.42 ± 4.87, Defensemen 53.67 ± 3.96). In both studied groups, mean salivary cortisol values increased mildly in mid-season, as did VO_2max levels (e.g., in Forwards, salivary cortisol increased from 5.67 to 6.91 ng/ml). According to the Spearman correlation coefficient, there is a strong, and a moderate relationship between cortisol levels and VO_2max levels, in pre- and mid-season, within the U18 2023 defense group (ρ = 0.6 and ρ = 0.36, Fig. 1).

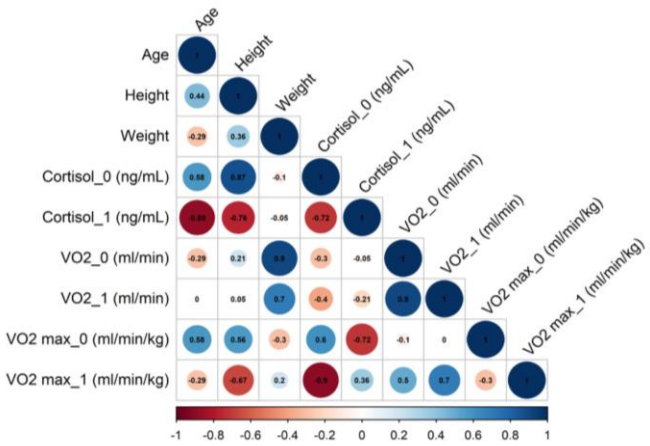

Fig. 1 Spearman correlation coefficients for all recorded variables in the U18 2023 defensemen group during pre/mid-season. (xxx_0 values stand for pre-season and xxx_1 values for mid-season)

IV. CONCLUSIONS

In conclusion, despite the lack of differences in physical performance metrics, an interesting trend was observed in the physiological response to training, as evidenced by the mild increase in mean salivary cortisol levels during the mid-season period. The correlation analysis indicates a significant relationship between cortisol and VO_2 max levels, particularly within the U18 2023 defense group, suggesting that hormonal responses may play a role in the physiological adaptations of young athletes. It is possible that defenders, who often engage in more physical confrontations, might experience different physiological responses that could affect their performance metrics differently than forwards.

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Relationship Between Healthy Lifestyle Behaviour and Quality of Life Among Active Adults

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Abstract | Healthy lifestyle behaviours, such as a healthy diet, regular physical activity, adequate sleep, and the avoidance of dangerous substances, are crucial for preventing chronic diseases and improving overall health. The purpose of this study is to evaluate healthy living behaviors and quality of life among active adults in Selangor, Malaysia, as well as to investigate the relationships between these factors. Four hundred sixty-one (461) people were interviewed using demographic profiles, the Health Promoting Lifestyle Profile II (HPLP II), and World Health Organisation Quality of Life (WHOQOL) tools. The findings show that active people are committed to health-promoting behaviours, albeit there is room for improvement, particularly in physical activity and nutrition. Quality of life scores indicate that, while physical health and environmental elements are regarded positively, psychological well-being and social interactions may be improved. Negative associations between healthy lifestyle behaviours and overall quality of life show that, while necessary for health, these behaviours may also be seen as stressful, potentially decreasing overall life satisfaction. Furthermore, interactions with others, despite their poor correlation, are significantly associated with health satisfaction. This study emphasize the need to take a balanced approach to health, incorporating varied lifestyle behaviours to improve several parameters of quality of life for active individuals.

Keywords: *Healthy lifestyle behaviour, quality of life, active adults.*

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I. INTRODUCTION

Healthy behaviours, such as a nutritious diet, regular physical activity, appropriate sleep, and abstaining from harmful substances, are critical for preventing chronic diseases and general health [1]. According to [2] and [3], the Health-Promoting Lifestyle Profile (HPLP) enables individuals to self-regulate their health-related behaviours while managing daily activities. Understanding health-related behaviours therefore becomes critical for determining the current level of society's health. Everyone should make it a goal to cultivate and adopt healthy lifestyles during their youth and early adulthood [4].

Quality of life is a wide assessment of personal responses to medical illnesses that influence satisfaction levels and include the everyday physical, psychological, and social consequences of these conditions. [5] identifies various aspects that impact an individual's quality of life, including personal qualities, social and economic circumstances, psychological issues, health-related elements, and environmental conditions. The fundamental idea is that adopting healthy lifestyle behaviours will increase one's quality of life [6].

However, there has been insufficient research associating physical fitness with psychosocial advantages in adults. Physical activity is widely acknowledged to play an important role in minimising the detrimental impacts of sedentary lifestyles on quality of life and enhancing overall well-being [7]. [8] emphasised the significance of certain components, such as dietary choices, regular exercise, and substance abstinence, in developing a healthy lifestyle. These scholarly contributions emphasise the link between healthy lifestyle behaviours and an active way of life, setting the framework for future research into how such behaviours operate.

Therefore, this study aims to investigate the relationship between healthy lifestyle behaviours and quality of life among active individuals in Selangor. We addressed the following research questions: (i) What are the healthy living behaviour of active adults? (ii) What is the quality of life for active adults? (ii) Is there a link between healthy lifestyle choices and quality of life among active adults?

II. METHODS

By using a cross-sectional research design, 461 people were interviewed using demographic profiles, the Health Promoting Lifestyle Profile II (HPLP II), and World Health Organization Quality of Life (WHOQOL) instruments. Demographic data will include a variety of independent variables, such as age, gender, BMI, marital status, socioeconomic status, and occupational status. The 52-item Healthy Behaviour-Promoting Lifestyle Profile (HPLP II) includes a total scale and six subscales that evaluate behaviours in the theorised components of a healthy lifestyle, such as spiritual growth, interpersonal relationships, nutrition, physical activity, health responsibility, and stress management. The WHOQOL-BREF is a 26-item questionnaire that assesses physical health (7 items), psychological health (6 items), social relationships (3 items), environmental health (8 items), and QOL and overall health. A cross-sectional research design was utilised to provide a picture of these parameters within the specified age range (20-39 years old).

III. RESULTS AND DISCUSSION

The results in Table 1 showed a negative relationship between many aspects of healthy living practices and overall quality of life. The general quality of life exhibits inverse associations with health responsibility (-0.338), physical activity (-0.353), diet (-0.117), spiritual growth (-0.359), interpersonal relations (-0.226), and stress management (-0.342). This implies that there is a stronger negative link between physical activity and spiritual growth, which suggests that these factors may have a greater influence on an individual's overall quality of life perception. This suggests that those who engage in these health-related actions more frequently might focus more on health-related problems or obstacles, which could reduce their overall quality of life perspective. The analysis of the relationship between health satisfaction and various healthy lifestyle behaviours revealed that most correlations were non-significant, except for interpersonal relationships (r = -0.032, $p < 0.05$), which showed a statistically significant, but weak, positive impact of social relationship on health satisfaction. The correlations with other behaviours, such as health responsibility (r = -0.160), physical activity (r = -0.080), nutrition (r = -0.041), spiritual growth (r = -0.172), and stress management (r = -0.160), were weak and non-significant, indicating that these factors do not play an important role in determining health satisfaction. These findings emphasise the complexities of integrating healthy living practices with overall life satisfaction, as well as the potential benefits of developing strong social networks to boost health satisfaction views.

The study found significant correlations between various healthy lifestyle behaviours and many aspects of quality of life among active adults in Selangor. Using the Healthy Behavior-Promoting Lifestyle Profile II (HPLP II) and the WHOQOL-BREF questionnaire, [1] discovered that active adults have moderately high levels of health responsibility, though there is still room for improvement in physical activity and nutrition. [9] say spiritual growth and stress management are both regarded equally, showing a holistic approach to mental and emotional well-being while [10] state that interpersonal relations also play a moderate role in promoting positive social interactions. Physical health scored quite high, indicating a favourable view of physical well-being [11], while [12] found psychological well-being scored significantly lower, indicating a need for better mental health care. The relationship between health satisfaction and healthy lifestyle behaviours was mainly non-significant, apart from interpersonal relationships, highlighting the tiny but substantial importance of social bonds [13]. [14] report mixed relationships between healthy living behaviours and other quality of life dimensions, which highlights the need for comprehensive interventions that address both physical and psychological requirements. Future treatments should prioritise making healthy activity choices more accessible and pleasurable, increasing social support, and addressing environmental variables to improve the overall quality of life for active adults.

TABLE 1
SIGNIFICANT CORRELATIONS HEALTHY LIFESTYLE BEHAVIOUR AND QUALITY OF LIFE AMONG ACTIVE ADULTS

Quality of Life	Health Responsibility	Physical Activity	Healthy Lifestyle Behaviour Nutrition	Spiritual Growth	Interpersonal Relations	Stress Management
General Quality of Life	-0.338	-0.353	-0.117	-0.359	-0.226	-0.342
Health Satisfied	-0.160	-0.080	-0.041	-0.172	-0.032*	-0.160
Physical Health	-0.164	-0.150	0.077	-0.051	-0.063*	-0.100
Psychology	-0.288	-0.348	-0.093	-0.403	-0.250	-0.416
Social Relationships	-0.281	-0.187	-0.074	-0.096	0.044*	-0.003
Environment	-0.371	-0.387	-0.123	-0.446	-0.198	-0.418

*Note: *p < 0.05*

IV. CONCLUSIONS

Finally, the study found strong relationships between components of healthy living behaviours measured by the HPLP II and several areas of quality of life assessed by the WHOQOL-BREF questionnaire. Physical activity, spiritual development, and health responsibility all have a favourable impact on physical health, psychological well-being, and social relationships. Physical activity is also associated with stress management, emphasising the advantages of an active lifestyle. Nutrition, albeit showing lesser correlations, is favourably related to physical activity, highlighting its importance in a healthy lifestyle. Spiritual development and interpersonal interactions have a substantial impact on quality of life, with interpersonal relationships improving perceptions of environmental quality. Thus, a well-rounded strategy that includes health responsibility, physical exercise, nutrition, spiritual development, and stress management might improve the quality of life for active adults.

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Relationship Between Social Media Usage and Mental Health Among Members of Kuala Lumpur and Country Club

Aql Alasri and Rozita Abdul Latif*.

Abstract | This study aimed to investigate the Relationship Between Social Media Usage and Mental Health Among Members of Kuala Lumpur Golf and Country Club. A quantitative research design was applied which was a survey method by distributing a questionnaire via Google form to 421 members of Kuala Lumpur Golf and Country Club. Bergen Social Media Addiction Scale (BSMAS) was used to evaluate social media usage among the members with 6 items. The Depression, Anxiety, and Stress Scale-21 (DASS-21) were used to assess mental health with 21 items. Descriptive analyses were used to determine the members' highest mental health factors involvement. The result showed no significant difference ($p = 0.408$) regarding mental health factors between genders. Therefore, it failed to reject the null hypothesis. In addition, there was a significant relationship ($p < 0.001$) between social media usage and mental health with a moderate positive level of correlation ($r = 0.494$). The study's findings will provide a greater understanding of the differences between genders regarding mental health factors among the members of KLGCC. The study found a positive association between social media usage and mental well-being. Social media facilitated stronger connections, fostered community, and served as a channel for sharing golf-related information. The context-specific nature of the relationship, centered around shared interests, aligned with recent research on the benefits of active, engaged social media use in specific communities. To build on the findings, KLGCC should implement workshops, online forums, and campaigns on responsible social media use and mental health awareness. They could also create dedicated social media groups for members to connect over common interests. Regular monitoring and feedback from members could optimize these initiatives for promoting good mental health.

Keywords: *Social media, mental health, Kuala Lumpur Golf and Country Club.*

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I. INTRODUCTION

Social media offers a unique opportunity for individuals to define their identities [2]. Social media is defined as internet-based apps that allow for user-generated content and engagement [1]. Social media has a global reach, with at least 3.5 billion users out of 7.7 billion. Malaysia's most popular platforms are YouTube, WhatsApp, and Facebook [5]. Emotional, psychological, and social well-being are all aspects of mental health that impact our attitudes, sentiments, and actions. The World Health Organization (WHO) defines mental health as a condition of well-being that permits individuals to effectively manage life's stressors, develop their potential, study and work effectively, and give back to their communities [4]. Still, many adults worldwide play organised sports. According to [5], the great majority of sports involvement takes place in organised recreational settings, with the main goals being fun and health.

II. METHODS

The methodology employed in this thesis involved a quantitative research design, utilizing a survey method to investigate the relationship between social media usage and mental health among members of the Kuala Lumpur Golf and Country Club (KLGCC). A structured questionnaire was distributed to 421 members via Google Forms. The questionnaire comprised three sections: demographic profile, the Bergen Social Media Addiction Scale (BSMAS) to assess social media usage, and the Depression, Anxiety, and Stress Scale-21 (DASS-21) to evaluate mental health factors. Data were analysed using descriptive statistics to identify the prevalence of mental health issues, and inferential statistics, including independent t-tests and Pearson correlation analysis, to examine the relationship between social media usage and mental health outcomes. Statistical analyses were conducted using SPSS software version 28.0.

III. RESULTS AND DISCUSSION

The results in Table 1 showed that there was no significant difference ($p = 0.408$) between genders regarding mental health factors. Therefore, it failed to reject the null hypothesis. In addition, there was a significant relationship ($p < 0.001$) between social media usage and mental health with a moderately positive level of correlation ($r = 0.494$). The study's findings will provide a greater understanding of the differences between genders regarding mental health factors among the members of KLGCC.

TABLE 1
PEARSON CORRELATION RESULTS FOR SOCIAL MEDIA USAGE ON MENTAL HEALTH

Variables		**Social Media Usage**
Mental Health	Pearson Correlation	0.494**
	Significant (2-tailed)	< 0 .001
	N	421

Social media and mental health are positively connected. The discussion highlights the importance of promoting balanced social media use and implementing support systems to mitigate its adverse effects on mental well-being. These findings contribute to the broader understanding of how digital behaviours influence mental health and underscore the need for targeted interventions within specific communities. Furthermore, research on social media's impact on mental well-being in a recreational club's context is crucial. By examining club culture, technology use patterns, and ethical considerations, researchers can develop targeted interventions and support strategies. This comprehensive approach can enhance mental health initiatives and promote positive social media engagement within recreational sports communities.

IV. CONCLUSIONS

Research on the relationship between social media usage and mental health among members of KLGCC (Kuala Lumpur Golf & Country Club) found a significant positive correlation. Social media likely facilitated stronger connections among members, fostered a sense of community, and served as an effective channel for sharing golf-related information and achievements. The context-specific nature of this relationship, focused on recreational sports, likely contributed to its positive outcomes. This finding aligns with recent research highlighting the potential benefits of active, engaged social media use within specific communities. The results suggest that KLGCC and similar organizations could benefit from leveraging social media as a tool for community building and promoting mental health. Further research is needed to understand the specific mechanisms through and how social media usage contributes to positive mental health outcomes in recreational sports communities.

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Relationship Between Social Support and Athlete's Readiness to Return to Play Sports

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Abstract | Although sports involvement has been extensively proven to have physical and psychological advantages, players often encounter substantial challenges that can impact their readiness for competition, including stress, injuries, and academic pressures. Having the social support of friends, coaches, teammates, and family might enhance individuals' readiness to compete once more. The goal of this study was to determine the relationship between social support and athlete's readiness to return to sports within the Faculty of Sports and Recreation athletes from UiTM Seremban 3. Questionnaire methods were utilized to collect data, with a total of 349 participants completing the Athlete's Received Support Questionnaire (ARSQ) and Psychological Readiness to Return to Sport. The results show a significant relationship between all dimensions of social support and readiness to play ($p < 0.001$). Emotional support has a significant positive moderate relationship ($r = 0.417$, $p < 0.001$). Esteem support has a significant positive moderate relationship ($r = 0.419$, $p < 0.001$). Informational support is a positive moderate relationship ($r = 0.373$, $p < 0.001$), and Tangible support is a significant positive moderate relationship ($r = 0.366$, $p < 0.001$). In conclusion, the data indicates that esteem support and readiness to play sports were connected. The Emotional, Esteem, Informational, and Tangible support significantly contributes to athletes' readiness, thereby enhancing their performance and overall sports experience, potentially improving performance and well-being overall.

Keywords: *Emotional support, informational support, esteem support, tangible support, readiness to return to play sports.*

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I. INTRODUCTION

College players who play both an athletic and academic role are likely to face a great deal of psychological stress for a variety of reasons [1]. In addition to the pressure to do well academically, collegiate players also had to deal with the demands of an athletic career [2]. Previous research findings suggest that this group of athletes may feel significant psychological discomfort because of the stress of maintaining such a rigorous and regimented routine [3]. Along with the stress associated with injuries, the stress associated with failure also contributes to depressive symptoms among college athletes [4]. The purpose of this study was to learn more about how college athletes saw the advantages of getting help to effectively recover from injuries and reintegrate into society after an injury that ended their career. Studies indicate that the general purpose of social support for injured athletes is to encourage them to return to play sports. In a study conducted by [11], almost half the athletes who sustained injuries exhibited mild to severe depression symptoms. The study also included the post-injury symptoms among college athletes, which showed most of the athletes with long-term injuries developed low self-esteem, and showed feelings of grief, resentment, and solitude [11]. The objective of this study is to determine the relationship between social support and athlete's readiness to return to play sports.

II. METHODS

This research uses correlational design to determine the relationship between social support and athletes' readiness to play among UiTM Seremban 3 Faculty of Sports and Recreation athletes. Total athletes are 1213. Based on the Krejcie and Morgan table, the sample that must be collected would be 291 people. To ensure the data collection process runs smoothly, the 20 percent dropout subject will be added to avoid subjects who cannot answer the questionnaire and have to cancel at the last moment, which will be $N = 350$.

It utilizes a structured questionnaire to collect data. The questionnaire was designed to measure two primary constructs: the level and type of social support (ARSQ: Athlete's Received Support Questionnaire) students perceive they receive, which the author is [14]. This questionnaire had 22 questions that were categorized into four dimensions (emotional, esteem, informational, and tangible). The reliability of this questionnaire is above ($\alpha = 0.956$) [12], as is their extent of readiness to play [13]. This questionnaire has 6 questions and is categorized into 3 levels of confidence. After the data collection process, the statistical analysis was performed using Jamovi, in which data is inserted into the software for analysis. The descriptive and inferential analysis data were performed to measure the strength of the correlation and *p*-value. The Pearson correlation was used.

III. RESULTS AND DISCUSSION

The results show a significant relationship between all dimensions of social support and readiness to play ($p < 0.001$). Emotional support has a significant positive moderate relationship with readiness to play in sports ($r = 0.417$, $p < 0.001$). While Esteem support has a significant positive moderate relationship with readiness to play in sports ($r = 0.419$, $p < 0.001$). Informational support has a positive moderate

relationship with readiness to play in sports ($r = 0.373$, $p < 0.001$), and tangible support has a significant positive moderate relationship with readiness to play in sports ($r = 0.366$, $p < 0.001$).

Different types of social support can have varying impacts. This study supports the previous observations from [9], which reported that different types of social support, such as emotional, informational, and instrumental support, can have varying impacts on individuals' psychological well-being and stress levels. The relationship can be influenced by who is providing the support. Support can come from anyone among athletes. It is encouraging to compare this result with that found by [10], who found that support for athletes can come from many sources, including coaches, teammates, family, and friends, each playing an important role in the athlete's performance and well-being.

The emotional support has a positive moderate relationship with readiness to play ($r = 0.417$, $p < 0.001$). Emotional support helps reduce stress and anxiety, which are common among injured athletes. Lower stress levels can facilitate better focus on rehabilitation and adherence to recovery protocols, leading to improved readiness to return to play. Emotional support can significantly reduce stress and anxiety in injured athletes, aiding in their focus on rehabilitation and adherence to recovery protocols, which enhances their readiness to return to play [5].

The esteem support has a strong positive moderate relationship with readiness to play ($r = 0.419$, $p < 0.001$). These results are consistent with those reported that esteem support is positively correlated with psychological well-being [6]. Esteem support plays an important role in confidence building. Esteem support often includes affirmations of an athlete's skills and abilities. Positive feedback and recognition from coaches, teammates, and significant others can boost the athlete's confidence in their ability to recover and perform at their previous level.

Informational support has a positive but weak relationship with readiness to play ($r = 0.373$, $p < 0.001$). Informational support is more about improving skills. These confirm the association between athletes who are well-informed about their treatment options, recovery timelines, and potential outcomes being better equipped to make informed decisions about their care and rehabilitation, which can lead to improved adherence to prescribed protocols [7].

The tangible support has a positive, weak relationship with readiness to play ($r = 0.366$, $p < 0.001$). Tangible support means providing practical assistance and resources that help individuals manage their challenges. These results seem to be consistent with other research that found financial support for medical expenses or educational costs can significantly reduce stress among athletes, enabling them to focus more effectively on their rehabilitation without the added burden of financial concerns [8].

TABLE 1
CORRELATION BETWEEN VARIABLES

		Mean Emotional Support	**Mean Esteem Support**	**Mean Informational Support**	**Mean Tangible Support**
Total Readiness	Pearson's r	0.417	0.419	0.373	0.366
	P-value	< 0 .001	< 0 .001	< 0 .001	< 0 .001

IV. CONCLUSIONS

In conclusion, the data indicates that esteem, support, and readiness to play sports are connected. The emotional, esteem, informational, and tangible support significantly contributes to athletes' readiness, thereby enhancing their performance and overall sports experience, potentially improving performance and well-being overall.

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Six-week Intermittent Exercise Training with and without Blood Flow Restriction on Physiological Responses and Endurance Performance in Young Adult Men

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Abstract | Exercise training with blood flow restriction (BFR) has gained attention for its potential to enhance muscular strength and hypertrophy, yet its combined effects with high-intensity intermittent exercise training (IET) remain underexplored. This study addresses this gap by evaluating the impact of a 6-week IET program, with and without BFR, on endurance performance and physiological responses in recreationally active young adult men. Twenty-eight participants were pair-matched (using estimated and randomly assigned to IET-BFR (*mean* ± *SD*: age 21 ± 2 years, body mass 59 ± 9 kg, height 1.7 ± 0.09 cm) and IET-only (*mean* ± *SD*: age 21 ± 2 years, body mass 60 ± 8 kg, height 1.69 ± 0.08 cm) groups. The IET-BFR group performed high-intensity intermittent exercises with inflatable cuffs (154 ± 6 mmHg) for 19.5 ± 0.5 minutes, while the IET-only group trained without cuffs. Both groups completed 12 training sessions, with assessments conducted using the Yo-Yo Intermittent Recovery Level 1 test (Yo-Yo IR1), blood lactate levels, heart rate (HR), and rate of perceived exertion (RPE). Results revealed a significant improvement in Yo-Yo IR1 performance (IET-BFR: 1,444 ± 319 m vs. IET-only 1,330 ± 362 m; $p < 0.05$) and significantly lower blood lactate levels during the exercise tests (IET-BFR: 7.37 ± 1.84 mmol.L-1 vs. IET-only 8.33 ± 2.20 mmol.L-1; $p < 0.05$). No significant differences were observed in HR or RPE between the groups. These results indicate that integrating BFR into IET protocols could boost exercise performance, potentially by increasing the efficiency of lactate clearance.

Keywords: *Blood flow restriction, intermittent exercise, physiological responses, endurance performance, lactate clearance.*

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I. INTRODUCTION

This study investigates the combined effects of blood flow restriction (BFR) [1] and high-intensity intermittent exercise training (IET) on endurance performance and physiological responses in recreationally active young men. It addresses the gap in research on BFR's impact when integrated with IET protocols [2], hypothesizing that BFR enhances exercise performance and reduces lactate accumulation.

II. METHODS

Twenty-eight young men (mean ± SD: age 21 ± 2 years, body mass 59 ± 9 kg, height 1.7 ± 0.09 cm) were divided into: IET-BFR (n = 14) and IET-only (n = 14). The IET-BFR trained with inflatable cuffs on their thighs (154 ± 6 mmHg), while the IET-only trained with minimal pressure cuffs. The training lasted 6 weeks, 3 days·week^{-1}. Performance was measured using the Yo-Yo Intermittent Recovery Test Level 1 (Yo-Yo IR1) [3], blood lactate [4], heart rate (HR) [5] and the rate of perceived exertion (RPE) [6].

III. RESULTS AND DISCUSSION

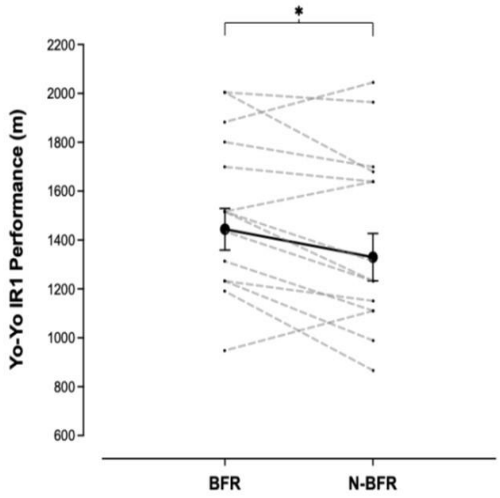

Fig. 1. The distance covered in the Yo-Yo IR1 between IET-BFR and IET-only post training (mean ± SEM and matched pair score).

The IET-BFR group showed an 8.3% improvement in Yo-Yo IR1 performance (1,444 ± 319 m) compared to the IET-only (1,330 ± 362 m, $p < 0.05$, Fig. 1). Additionally, the IET-BFR had significantly lower blood lactate levels (7.37 ± 1.84 mmol·L^{-1}) during exercise compared to the IET-only (8.33 ± 2.20 mmol·L^{-1}, $p < 0.05$, Fig. 2). No significant differences were observed in HR or RPE between the groups ($p > 0.05$). The results support the previous study [7], demonstrating that exercise training with BFR significantly enhances endurance performance. Additionally, the study's findings are consistent with those of [8], who reported the effectiveness of training with BFR in attenuating blood lactate levels during exercise.

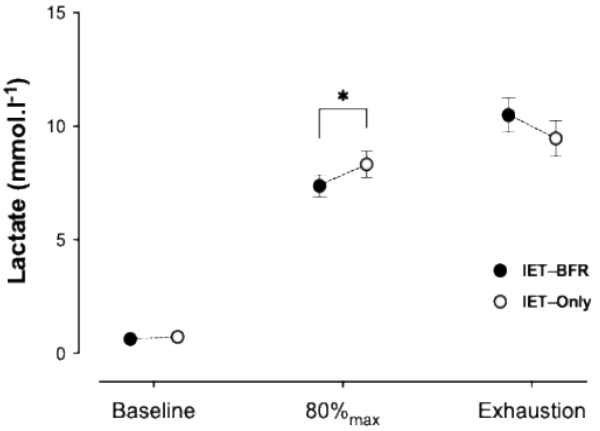

Fig. 2 Mean and standard errors of change in blood lactate at baseline, 80% max, and exhaustion following IET-BFR and IET-only.

IV. CONCLUSIONS

IET with BFR improves performance, possibly via attenuation of the rise in blood lactate level. Future studies should explore long-term effects and potential benefits for different athletic populations and types of exercise.

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Sports Participation on Multiple Intelligences: A Cross-Sectional Study of University Student-Athletes

Hazirah Pethie and Patricia Pawa Pitil*.

Abstract | Student-athletes are a unique group, facing numerous challenges in maintaining excellent academic performance while balancing their sports commitments. Participation in sports has significantly impacted their socialization, intellectual growth, and character building. It is essential to address the factors underlying these issues and devise effective strategies to help student-athletes successfully navigate their academic and athletic pursuits. Howard Gardner's theory of multiple intelligences (MI) provides a valuable framework for understanding the diverse cognitive strengths and weaknesses of individuals. This theory posits that intelligence is not a single entity but rather a combination of several distinct intelligences, including kinesthetic, intrapersonal, logical, interpersonal, and linguistic intelligences. By evaluating student-athletes through the lens of MI, we can gain insights into how their unique intelligence profiles influence both their athletic performance and personal growth. The objective of this study was to investigate the multiple intelligences of student-athletes and examine the differences in MI subdomains based on gender, type of sport, age group, and ethnicity. To achieve this objective, a cross-sectional survey research design was employed, utilizing a sample of 182 student-athletes representing the university. Overall, the multiple intelligences of the students were high. Among the five MI subdomains, kinesthetic intelligence scored the highest ($M = 21.51 \pm 2.99$), followed by intrapersonal ($M = 20.17 \pm 3.13$) and logical intelligences ($M = 18.78 \pm 2.83$). Interpersonal ($M = 17.80 \pm 3.11$) and linguistic intelligence ($M = 15.33 \pm 3.35$) received the lowest scores. Independent sample t-test results revealed significant differences in the kinesthetic, interpersonal, and intrapersonal intelligences between genders, while logical and interpersonal intelligences differed significantly by type of sports ($p < 0.05$). Logical intelligence was the only subdomain showing a significant difference between age groups, while none of the ethnicity groups showed significant differences in any of the subdomains ($p > 0.05$). Significant differences were found in several MI subdomains based on gender, type of sport, and age group. Specifically, kinesthetic, interpersonal, and intrapersonal intelligences differed between genders, while logical and interpersonal intelligences varied by type of sport. Additionally, logical intelligence showed differences across age groups. Overall, the results underscore the importance of a holistic approach in supporting student-athletes, leveraging their strengths in kinesthetic, intrapersonal, and logical intelligences while addressing areas like interpersonal and linguistic intelligences. Tailored strategies based on MI profiles can help balance their athletic success and personal development.

Keywords: *Athletic performance, multiple intelligences, student-athletes, university students.*

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I. INTRODUCTION

University student-athletes face the unique challenge of balancing rigorous academic requirements with the demands of their athletic commitments. This balancing act requires not just physical endurance and skill but also a diverse set of cognitive abilities. Traditional intelligence assessments, such as IQ tests, often fail to account for the wide range of intelligences that contribute to both academic and athletic success [1]. Howard Gardner's Theory of Multiple Intelligences (MI) [2] provides a more comprehensive framework, identifying distinct forms of intelligence such as kinesthetic, intrapersonal, logical, interpersonal, and linguistic intelligence. Despite the applicability of this theory to student-athletes, research exploring the MI profiles of this group remains limited. Thus, this study aims to investigate the multiple intelligence profiles of university student-athletes and examine how these profiles vary based on demographic factors such as gender, type of sport, age, and ethnicity.

II. METHODS

The study employed a cross-sectional design and was conducted among university athletes from UiTM Sarawak. A total of 182 active student-athletes participated, recruited through convenience sampling from a population of 230 athletes (source: Sports Unit, UiTM Sarawak). The data collection instrument was the Multiple Intelligence Questionnaire (MIQ) [3], which includes 25 items across five MI subdomains: linguistic, logical, kinesthetic, interpersonal, and intrapersonal intelligences. The MIQ uses a 5-point Likert scale ranging from "never" to "always." The Cronbach's alpha for the questionnaire was reported at 0.821, indicating good internal consistency. The data were analyzed using SPSS Version 27.0. Descriptive statistics were calculated for all subdomains, and inferential statistics were applied to test for significant differences in MI based on gender, type of sport, age, and ethnicity. Independent sample t-tests and one-way ANOVA were used, with a significance level set at $p < 0.05$.

III. RESULTS AND DISCUSSION

The results revealed significant differences in certain MI subdomains based on gender and type of sport. Male athletes scored significantly higher than female athletes in kinesthetic, interpersonal, and intrapersonal intelligences. This suggests that male athletes may have better physical coordination, a greater ability to understand and manage their own emotions, and a better understanding of others' moods and intentions [4].

When comparing team sports to individual sports, team sport athletes scored higher in interpersonal intelligence, reflecting their enhanced ability to navigate social dynamics and understand others' perspectives [5]. No significant differences were found between individual and team sports in other MI subdomains ($p > 0.05$).

Regarding age, older athletes (over 24 years) exhibited higher logical intelligence ($p < 0.05$), likely due to greater cognitive and emotional maturity, which allows for more systematic problem-solving and decision-making under pressure.

Interestingly, no significant differences in MI were found across different ethnicities ($p > 0.05$). This finding may reflect the unified athletic culture and shared experiences that university sports teams

promote, which could lead to similar cognitive and emotional development among athletes regardless of their ethnic background.

TABLE I
DIFFERENCES IN MULTIPLE INTELLIGENCE AMONG UNIVERSITY ATHLETES BY DEMOGRAPHICS (N = 182)

Variable	Linguistic Int.	Logical Int.	Kinesthetic Int.	Interpersonal Int.	Intrapersonal Int.
Gender *M* ± *SD*					
Male (n = 91)	15.25 ± 3.90	19.13 ± 2.94	22.41 ± 2.52*	18.28 ± 3.23*	20.83 ± 2.91*
Female (n = 91)	15.42 ± 2.85	18.43 ± 2.69	20.60 ± 3.15*	17.31 ± 2.87*	19.50 ± 3.21*
Types of sports					
Ind (n = 53)	15.11 ± 3.32	19.13 ± 2.99	21.26 ± 3.54	16.62 ± 3.12*	20.11 ± 3.64
Team (n = 129)	15.42 ± 3.41	18.63 ± 2.76	21.61 ± 2.74	18.28 ± 2.99*	20.19 ± 2.91
Age groups (years)					
18-20 (n = 35)	14.11± 3.49	19.34 ± 3.35*	21.97 ± 2.39	17.54 ± 3.53	20.97 ± 2.89
21-23 (n = 141)	15.59 ±3.28	18.55 ±2.24*	21.35 ± 3.11	17.84 ± 3.01	19.91 ±3.18
> 24 (n = 6)	16.4± 3.13	24.00 ±2.90*	22.00 ± 3.16	18.60 ±3.85	21.00 ±1.87
Ethnicities					
Malay (n = 36)	15.94 ± 3.35	18.83 ±2.75	21.64 ± 2.76	17.83 ±3.25	20.83 ± 3.25
B. Sarawak (n = 91)	14.67 ±3.18	19.00 ± 2.64	21.74± 2.84	17.89 ± 3.15	20.35 ± 2.96
B. Sabah (n = 55)	16.06 ±3.50	18.41 ±3.19	20.98± 3.34	17.76± 2.88	19.46 ± 3.27

IV. Conclusions

This study underscores the importance of recognizing the diverse cognitive strengths of university student-athletes, as outlined by Gardner's Theory of Multiple Intelligences. The significant variations in MI profiles based on gender, type of sport, and age highlight the need for tailored educational and coaching strategies that leverage these unique strengths. The lack of differences across ethnicities suggests that the university sports environment may play a unifying role in cognitive development. Future research should explore how these findings can be applied in educational settings to better support the academic and athletic success of student-athletes.

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The Analysis of Chelsea Performance Under Three Different Coaches During the English Premier League 2022/2023 Season

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Abstract | The essence of a football club's success fundamentally hinges on its performance. In professional football, the dismissal of a coach is a significant and common occurrence, typically considered when the team's results fall short of the board's expectations. It is widely acknowledged among researchers that poor performance is a primary factor driving coaching changes. Despite extensive research on this subject, the impact of coaching changes on team performance remains ambiguous. Recent managerial changes at Chelsea have raised debate regarding their impact on team performance, reflecting a long history of trophy-chasing and frequent coach turnover. This study analyzed 38 matches of Chelsea FC from the 2022/2023 English Premier League season to evaluate and compare the team's performance under the coaching of Thomas Tuchel, Graham Potter, and Frank Lampard throughout their respective tenures. All matches were assessed based on the effectiveness and failure rates of short passes, long passes, shots, crosses, and tackles. One-way ANOVA revealed significant differences ($p < 0.05$) in two performance indicators (unsuccessful short passes and unsuccessful shots) across the three coaches. The results suggest a notable decline in team performance following each coaching transition. The findings of this study indicate that changes in coaching can cause destabilization within a team's internal structure and staffing, potentially leading to a decline in performance. Coaches typically require at least one year to implement tactical changes effectively and ensure that players adapt to their strategic approach. The limited duration of less than a year provided to Chelsea's coaches has likely contributed to a decline in team performance.

Keywords: *Football, coach, performance indicator.*

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I. INTRODUCTION

Football, sometimes referred to as soccer, is a team sport typically consisting of eleven players. Two 45-minute halves make up a regulation game, with a 15-minute intermission [1]. Gus Mears bought the Stamford Bridge athletic stadium with the goal of turning it into a football field in 1904, which marked the founding of Chelsea Football Club [2]. Chelsea has faced difficulties recently that have been linked to the managerial style; many managers have been hired, fired, and some have resigned to avoid the embarrassment of receiving a letter of termination, which they view as a black mark on their resume [2]. In sports analysis, performance indicators are variables chosen and combined to define specific aspects of performance and contribute to success [3]. Finding one's own team's strengths and weaknesses is the primary goal of match analysis, as doing so allows one to focus on improving and developing the former. Analyzing an opponent's performance, a coach will do the same to find ways to counter that team's advantages and take advantage of its disadvantages [4]. This study aims to compare Chelsea's performance indicators (short pass, long pass, shots, cross, and tackle) between Thomas Tuchel, Graham Potter, and Frank Lampard during the 2022/2023 season.

II. METHODS

The research design for this study is causal comparative, also known as ex-post facto research design. A total of 38 football matches ($N = 38$) from the 2022/2023 English Premier League season were examined in this study: 6 games from Thomas Tuchel, 29 from Graham Potter, and 9 matches from Frank Lampard. All the video recordings, which ranged in length from 90 to 100 minutes, were complete matches. The video footage was carefully collected and recognized before processing. The analysis was conducted using Nacsport Video Analysis Software, a specialized software for sports performance analysis, that has been used to gather the data. For each match, there is a 24-hour rest period in between to ensure accurate results. Every match is viewed and examined twice to boost the validity and dependability of the data. Each performance indicator has been separated into two different categories, which are successful and unsuccessful. The demographic data were described using descriptive analysis, and inferential statistics were utilized to show the comparison of performance indicators between the three coaches. One- way ANOVA was used to compare the performance indicators of the three coaches. Jamovi version 2.3.28.0 was utilized for the analysis, and a significance level of $p < 0.05$ was established.

III. RESULTS AND DISCUSSION

Since all the data was normal, a one-way analysis of variance (ANOVA) was conducted to compare the performance indicators between the three coaches. Based on Table 1, it showed that between the three coaches, there were significant differences in 2 out of 10 performance indicators ($p < 0.05$). Since the p-values for the remaining eight variables were higher than 0.05, there were no discernible differences between them. A line chart showing the mean score of indicators with significant differences between the three coaches is also shown in Figure 1.

TABLE I
ANALYSIS OF PERFORMANCE INDICATOR AND COACHES

Variable	Sum of Squares	*Df*	Mean Square	*F*	*p*
Short Pass Successful	889	2	445	0.060	0.451
Short Pass Unsuccessful	5864	2	2932	22.8	0.001*
Long Pass Successful	59.2	2	29.6	0.634	0.536
Long Pass Unsuccessful	83.2	2	41.6	0.700	0.503
Shots Successful	42.9	2	21.46	2.71	0.081
Shots Unsuccessful	120	2	60.1	4.58	0.017*
Crossing Successful	11.5	2	5.73	1.06	0.357
Crossing Unsuccessful	43.4	2	21.7	0.765	0.518
Tackle Successful	8.28	2	4.14	0.272	0.76
Tackle Unsuccessful	14.3	2	7.17	0.514	0.491

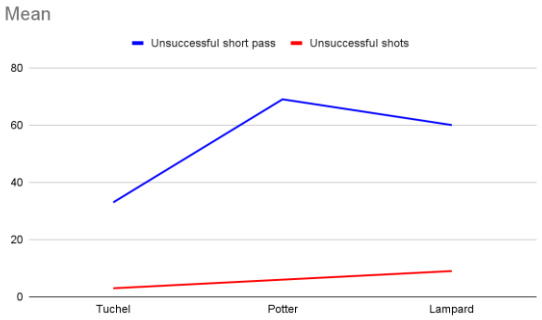

Fig 1. Mean differences between the three coaches

A. Unsuccessful short pass

Firstly, an unsuccessful short pass with a p-value difference of less than 0.001 between Frank Lampard, Graham Potter, and Thomas Tuchel. Among the two coaches, Thomas Tuchel has the lowest mean (33), while the other two have much higher means (69 and 60) for unsuccessful short passes. In football, quick transitions, teamwork, and possession retention all depend on short passing [5]. By breaking through the opponent's defense and passing the ball quickly and accurately between players, teams can create scoring opportunities [6].

B. Unsuccessful shots

The p value between Frank Lampard and Thomas Tuchel is 0.013 after that, indicating a significant difference in coaches and missed shots. There isn't much of a distinction between Frank Lampard and Graham Potter, nor between Thomas Tuchel and Graham Potter. With a 28.1% unsuccessful shot percentage over the course of all games, Thomas Tuchel has the lowest percentage. Conversely, Frank Lampard has a percentage of 68.1%, and Graham Potter has a percentage of 51.3%. In football, the ability to kick the ball or shoot is important because it influences the likelihood of creating chances for goals against the opposition [7].

IV. CONCLUSIONS

This study compared Chelsea's performance indicators short passing, long passing, shooting, crossing, and tackling under Thomas Tuchel, Graham Potter, and Frank Lampard during the 2022/2023 season. Mid-season coaching changes showed short-term improvements, but ongoing coaching proved better for long-term success. Data indicated that under Tuchel, Chelsea had the fewest unsuccessful shots and passes. His focus on tactical precision and effective offensive strategies increased goal conversion, which is essential for winning matches.

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Comparison of Type of Set and Set Zone Between China and Italy During the 2023 FIVB U21 Women's Volleyball Championships

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Abstract | The 2023 FIVB Volleyball Women's U21 World Championship, held in Mexico from 17 to 26 August, marked the 22nd edition of the tournament, featuring national teams under the age of 20. This study focuses on the top two countries, China and Italy, analyzing their setting zones during the championships. Two types of sets, standing and jumping, were examined across six setting zones: zones 1, zone 2, zone 3, zone 4, zone 5 and zone 6. A total of 15 matches played by China ($N = 770$) and Italy ($N = 709$) were analyzed using Microsoft Excel and Statistical Package for the Social Sciences (SPSS) version 26.0. Reliability and validity testing via Pearson Correlation revealed $r = 0.93$, while descriptive statistics indicated that Italy exhibited higher means and larger standard deviations for both the type of set and setting zone variables, suggesting greater variability compared to China. Chi-square tests of independence showed significant associations between the type of set and setting zones for both China ($\chi^2 = 84.120$, $df = 5$, $p = 0.001$) and Italy ($\chi^2 = 66.829$, $df = 5$, $p = 0.001$), indicating distinct strategic preferences in their set plays. The analysis revealed that the jumping set directed to zone 4 is the most effective combination. China and Italy, the top two teams, exhibited a significant preference for this zone, with the highest frequencies of sets directed towards Zone 4. This strategic insight highlights the importance of targeting Zone 4 to optimize set plays and enhance competitive performance in volleyball. The study underscores the importance of strategic planning in volleyball demonstrating that both countries employ unique approaches to optimize performance and counter opponents' strategies effectively.

Keywords: *Volleyball, stand set, jump set, set zone, women.*

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I. INTRODUCTION

Volleyball was a team-oriented sport where two groups, each consisting of six players, were divided by a net, and both strove to earn points through specific regulations by successfully directing the ball onto the opposing team's court [1]. In volleyball, there were six basic skills: passing, setting, spiking, blocking, digging, and serving. The setter position was considered the most important position in volleyball, as the setter essentially ran the team offense. Set is an essential action in volleyball, not only from the technical point of view but also from the tactical one, as it affects the attack since the setter is the specialist player who is responsible for organizing the game [2]. There were two types of sets: the jump set and the standing set [3] [4]. The set's area, known as the set zone, where the attack strike was executed, was divided into four categories: the defense zone, zone 2, zone 3, and zone 4 [4]. The 2023 FIVB Volleyball Women's U21 World Championship, held in Mexico from August 17 to August 26, marked the 22nd edition of the tournament, featuring national teams under the age of 21. The connection between the setter's area and the zones of attack used in the game indicates that the setter's position, whether in the front or backcourt, could influence the attacking tempo, shedding light on the intricate dynamics of the sport [5].

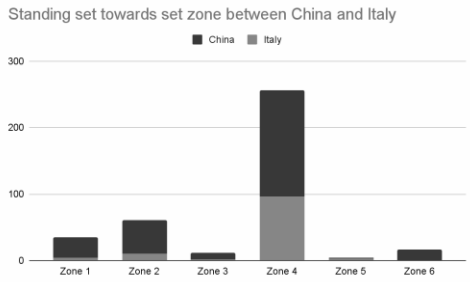
II. METHODS

The methodology of this study employed an ex-post-facto design with a quantitative approach, using purposive sampling to select a sample consisting of 15 matches played by the China and Italy teams during the 2023 FIVB U21 Women's Volleyball Championships, with a total of (N = 770) and (N = 709) sets, respectively. The inclusion criteria focused on the comparison of set types and setting zones, specifically targeting female athletes under the age of 21 from China and Italy who participated in the championship. The data collection procedure encompassed ethical issues, a detailed background of the study, and a description of the particular cases. Data analysis and gathering, which involved video analysis of the matches, followed details of the research setting and data reporting. All the data had been collected by Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Chi-square test was employed for the statistical analysis to examine the associations between set types and setting zones.

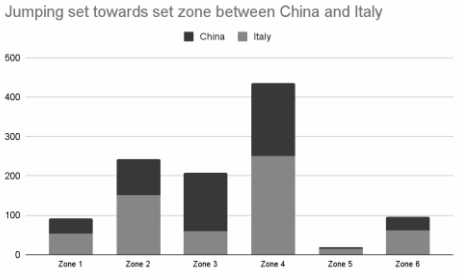
III. RESULTS AND DISCUSSION

The data collected in this study focused on several critical aspects: reliability testing, statistical assumptions, descriptive statistics, and inferential statistics. Initially, the reliability of the data was assessed through intra-tester reliability testing to ensure consistency and accuracy in measurement. Reliability and validity testing via Pearson correlation revealed r = 0.93, while descriptive statistics indicated that Italy exhibited higher means and larger standard deviations for both the type of set and setting zone variables, suggesting greater variability compared to China.

GRAPH 1
RESULT OF STANDING SET TOWARDS SET ZONE BETWEEN CHINA AND ITALY



GRAPH 2
RESULT OF JUMPING SET TOWARS SET ZONE BETWEEN CHINA AND ITALY



The crosstabulation results revealed distinct patterns in the distribution and utilization of standing and jumping sets across six different zones for both countries. China exhibited a more concentrated use of specific zones for standing sets, particularly Zone 4, with relatively lower frequencies in other zones. In contrast, Italy showed an even more concentrated distribution in jumping sets, heavily favouring Zone 4 and minimally using other zones. For jumping sets, both countries displayed a preference for Zone 4, but China's distribution was slightly more even across the other zones compared to Italy. Italy's jumping set distribution also favoured Zone 4 but showed a more significant use of Zone 2 and a balanced spread in other zones.

TABLE 1
THE RESULTS OF THE CHI SQUARE TEST BETWEEN CHINA AND ITALY

Country		**Value**	***df***	**Sig.**
China	Pearson Chi-Square	84.120	5	0.001
	N	770		
Italy	Pearson Chi-Square	66.829	5	0.001
	N	709		

A chi-square test of independence was performed to evaluate the relationship between the type of set and the setting zone for both China and Italy. Chi-square tests of independence showed significant associations between the type of set and setting zones for both China ($\chi^2 = 84.120$, $df = 5$, $p = 0.001$) and Italy ($\chi^2 = 66.829$, $df = 5$, $p = 0.001$), indicating distinct strategic preferences in their set plays. The analysis

revealed that the jumping set directed to zone 4 is the most effective combination. China and Italy, the top two teams, exhibited a significant preference for this zone, with the highest frequencies of sets directed towards Zone 4. This strategic insight highlights the importance of targeting Zone 4 to optimize set plays and enhance competitive performance in volleyball.

The comparison between China and Italy revealed both similarities and differences In their set type distributions. Both countries exhibited significant Chi-Square values, indicating that neither followed a uniform distribution in their set plays. The Chi-Square test results affirmed that both China and Italy employed distinct set play strategies, which could be crucial for their competitive performance.

IV. CONCLUSIONS

The set play strategies of the Chinese and Italian volleyball teams during the 2023 FIVB U21 Women's Volleyball Championships highlighted significant differences in their approaches. The Chi-Square test confirmed significant differences in the use of set types across zones. The jumping set directed to Zone 4 is the most effective, with China and Italy, the top two teams, showing a significant preference for this zone. The minimal use of other zones suggested a highly specific tactical approach where standing sets were predominantly directed to Zone 4, possibly due to perceived advantages or strengths in this area. These findings suggested that the ball's distribution was not influenced by where it was received but likely due to the preferences of specific attackers. The null hypothesis was rejected because the test produced a *p*-value below the significance level. This result indicates a significant difference between the type of set and the setting zone.

ACKNOWLEDGMENT: I am deeply grateful for the strength and opportunity I had to complete this study. I also extend my sincere thanks to everyone whose guidance and support were crucial throughout this journey. I hope this research on volleyball performance analysis will be a valuable resource for improving team performance and inspiring future work in the field.

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The Development of Drowning Prevention Strategies Model in Malaysia: Need Survey Analysis

Muhammad Wafi A. Rahman, Mazuki Mohd Yasim*, Azli Ibrahim, Md Amin Md Taff, Nik Jazwiri Johanis, and Mohd Shariman Safie.

Abstract | Drowning remains a significant public health concern in Malaysia, particularly among children. Despite ongoing efforts to mitigate this risk, there is a pressing need for a comprehensive drowning prevention model tailored to the Malaysian context. This study aims to develop a drowning prevention strategies model through an extensive need survey analysis among parents, educators, and community leaders. Therefore, the main purpose of this study was to know the scenario and the need for analysis of the drowning prevention model from the expert point of view. The study is based on the Develop and Design Research (DDR; Saedah, Muhammad & Rozaini, 2020). IBM Statistics (SPSS) is utilized as the main statistical analysis software. A total of 187 respondents (N = 187) among units of Pasukan Penyelamat di Air (PPDA) under Jabatan Bomba dan Penyelamat Malaysia (JPBM) have purposively been selected. Based on the analyses, over 90% of agree was achieved for all statements in the survey. These findings provided a platform and systematic scholarly work on strategies for drowning prevention model development.

Keywords: *Drowning incidents, Drowning Prevention Model.*

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I. INTRODUCTION

The drowning incident is one of the leading causes of accident-related deaths worldwide. According to the World Health Organization (WHO), drowning incidents are estimated to claim the lives of 372,000 [2]. Asia reported the highest risk drowning rates of childhood, approximately 30 per 100,000 children aged 1 to 4 years old [1]. According to statistics released by the *Jabatan Bomba dan Penyelamat Malaysia* (JPBM), there are 400 cases of drowning each year, and it should be taken seriously by the entire community [4].

II. METHODS

In this research, a modified Design and Development Research (DDR) approach was used, Saedah Siraj [6], which involves three phases, including the crucial Needs Analysis Phase. The needs analysis phase is essential in model development [5], as it helps identify research questions and solutions for the target population. This statement was also supported by [3], who emphasised that it is crucial to identify the research questions generated in formulating models that will be developed primarily in the DDR approach. To gather expert opinions and consensus, a survey was conducted among 187 members of the *Pasukan Penyelamat di Air* (PPDA) from the Malaysia Fire and Rescue Department (JPBM) across Malaysia. The survey instrument questionnaires were used as the primary tool for this phase.

III. RESULTS AND DISCUSSION

There are two findings reveals in this study consist of demographic data and need survey analysis findings.

A. Demographic Analysis of Respondents

In Table 1, the data show that all participants were male, with most identifying as Malay. A minority (8.6%) represented other ethnicities, including Peranakan and foreign nationals living in Malaysia. Over half of the respondents (55.6%) had more than 10 years of experience in water rescue activities, making them the most experienced group. Participants with 5 to 10 years of experience made up 27.3%, while 17.1% had 1 to 5 years of experience.

TABLE I
DEMOGRAPHIC DATA

Variables		**Frequency**	**(%)**
Gender	Male	187	100
	Female	-	-
Race	Malay	171	91.4
	Others	16	8.6
Experience	>1 year < 5 years	32	17.1
	>5 years <10 years	51	27.3
	>10 years	104	55.6

B. Need Survey Analysis Findings

In this study, the needs survey analysis included three key questions. The first question was analysed using frequency and percentage, while the second and third questions were evaluated using a 5-point Likert scale, with each point on the scale representing different levels of agreement.

TABLE II
NEED SURVEY ANALYSIS ITEM 1

Item 1: Have you ever known about the existence of Drowning Prevention Strategy Model in Malaysia?	
Yes (4.8%)	No (95.2%)

An analysis of item 1 reveals that most of the respondents (n = 178) were not aware of the existence of the Drowning Prevention Strategy Model in Malaysia. Only (n = 9) respondents stated that they were familiar with the existence of the Drowning Prevention Strategy Model in Malaysia. However, based on the findings, none of the models mentioned by the respondents align with the drowning prevention model.

TABLE III
NEED SURVEY ANALYSIS ITEM 2

Item 2: Is it difficult to get a Drowning Prevention Model for guidance in designing outdoor recreation programs for water activities in Malaysia?

	N	***%***	**Percentage of agree**
Strongly Agree	83	44.4	
Agree	81	43.3	90.9%
Moderately Agree	6	3.2	
Disagree	15	8	
Strongly disagree	2	1.1	
Strongly Agree	83	44.4	

The highest percentage was ‘Strongly Agree’ at 44.4 percent (n = 83), followed by ‘Agree’ at 43.3 percent (n = 81), ‘Moderately Agree’ at 3.2 percent (n = 6), then, ‘Disagree’ at 8 percent (n = 15) of the

responses and the least was "Strongly disagree" at 1.1 percent (n = 2). The aggregate score pertaining to Item 3 amounts to 90.9 percent agreement. The analysis strongly indicates that a majority of survey participants agreed that it was difficult to get a Drowning Prevention Model for guidance in designing outdoor recreation programs for water activities in Malaysia.

TABLE IV
NEED SURVEY ANALYSIS ITEM 3

Item 3: Do you agree if progressive steps should be taken to build a Drowning Prevention Strategy Model in Malaysia			
	n	***%***	**Percentage of agree**
Strongly Agree	101	54.0	98.4%
Agree	77	41.2	
Moderately Agree	6	3.2	
Disagree	1	0.5	
Strongly disagree	2	1.1	
Strongly Agree	101	54.0	

The highest frequency was 'Strongly Agree' with 54 percent (n = 101), followed by 'Agree' with 41.2 percent (n = 77), followed by 'Moderately Agree' with 3.2 percent (n = 6) responses, then 'Disagree' with 0.5 percent (n = 1), and the lowest 'Strongly disagree' with 1.1 percent (n = 2) responses. The overall score for Item 4 was 98.4 percent agree. The analysis recommended that the majority respondents agreed that progressive steps should be taken to build a Drowning prevention Strategy Model in Malaysia.

The survey analysis of expert responses highlights an urgent need for a drowning prevention strategy model in Malaysia. The country has seen a significant rise in drowning incidents, with approximately 90% of cases reported to the fire and rescue department resulting in fatalities, totalling 245 nationwide [4]. Alarmingly, no follow-up actions have been implemented to prevent future incidents at sites where drownings have occurred. As a result, drownings continue to happen in the same areas, involving new victims. These findings strongly suggest the necessity of developing a drowning prevention strategy model to effectively reduce drowning cases in Malaysia.

IV. CONCLUSIONS

In summary, the survey results reveal a strong consensus among respondents on the need for drowning prevention models. The data is particularly valuable because the respondents are experienced trainers from *Pasukan Penyelamat di Air* (PPDA) with over five years of experience in water and rescue activities in Malaysia. This ensures that the data is both relevant and significant to the study's objectives

ACKNOWLEDGMENT: My appreciation goes to my supervisors, Faculty of Sports Science and Coaching and all panel experts for their unwavering support.

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The Effect of AMRAP Training on Fitness Components Among Healthy Collegiate Students

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Abstract | In recent years, there has been a rise in global concern over sedentary behavior due to its negative impact on health and well-being. The As Many Reps/Rounds as Possible (AMRAP) training methodology, integral to high-intensity interval training (HIIT) programs, has garnered attention in the fitness industry for its versatility, time efficiency, and substantial health benefits. This study aimed to examine the effects of AMRAP training on body composition, flexibility, muscular strength, muscular endurance, and cardiovascular endurance in healthy collegiate students. A total of 24 healthy collegiate students (17 males, 7 females) aged 20-21 years participated in the study. Participants were randomly assigned to either an AMRAP or Traditional Resistance Training (TRT) group for six weeks. The AMRAP group performed exercises designed to maximize repetitions or rounds within a specified timeframe, while the TRT group followed a conventional resistance training protocol. Both groups trained three times per week at 60%-67% of maximum heart rate. Fitness components were assessed using standard protocols: body composition was measured via bioelectrical impedance analysis, flexibility with a sit-and-reach test, muscular strength with a hand-grip test, muscular endurance with a push-up test, and cardiovascular endurance with a VO2 max test. Statistical analysis was conducted using paired t-tests to compare pre- and post-intervention results within groups and independent t-tests to compare differences between groups. Both groups showed significant improvements in body composition (AMRAP: -4.5% body fat, TRT: -3.4% body fat), flexibility (AMRAP: -0.3 cm, TRT: -5 cm), muscular strength (AMRAP: +2.4 kg, TRT: +2.2 kg), muscular endurance (AMRAP: +12 push-ups, TRT: +13 push-ups), and cardiovascular endurance (AMRAP: +10.7 ml/kg/min VO2 max, TRT: +12.4 ml/kg/min VO2 max). However, no significant differences were observed between the AMRAP and TRT groups in any of the fitness components. The absence of significant differences between groups may be due to the short duration of the intervention. Future research with extended training periods is recommended to fully understand the potential impact of AMRAP training on fitness components in healthy collegiate students. In conclusion, these findings suggest that AMRAP can be an effective alternative to traditional resistance training, especially for those seeking time-efficient workout options.

Keywords: *AMRAP training, body composition, collegiate students, muscular strength, muscular endurance.*

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I. INTRODUCTION

Sedentary behavior has become a significant global health concern due to its adverse effects on health and well-being. High-intensity interval training (HIIT), particularly the As Many Reps/Rounds as Possible (AMRAP) methodology, has emerged as a popular fitness approach known for its versatility, time efficiency, and substantial health benefits [1]. Despite its rising popularity, there is limited research on the effects of AMRAP training on various health fitness components among students [2]. This study aims to investigate the impact of AMRAP training on body composition, flexibility, muscular strength, muscular endurance, and cardiovascular endurance in healthy collegiate students.

II. METHODS

A total of 24 healthy collegiate students (17 males, 7 females) aged 20-21 years participated in the study. Participants were randomly assigned to either an AMRAP or Traditional Resistance Training (TRT) group for six weeks. The AMRAP group engaged in exercises aimed at maximizing repetitions or rounds within a specified timeframe, while the TRT group followed a conventional resistance training protocol. Both groups trained three times per week at 60%-67% of their maximum heart rate. Fitness components were assessed using standard protocols such as body composition was measured via bioelectrical impedance analysis, flexibility with a sit-and-reach test, muscular strength with a hand-grip test, muscular endurance with a push-up test, and cardiovascular endurance with a Vo2max test.

III. RESULTS AND DISCUSSION

Statistical analysis was conducted using paired t-tests to compare pre- and post-intervention results within groups, and independent t-tests to compare differences between groups. Figure 1 displayed changes in all variables measured between pre and post of training and between groups where significant improvements was shown in body composition (AMRAP: -4.5% body fat, TRT: -3.4% body fat), muscular strength (AMRAP: +2.4 kg, TRT: +2.2 kg), muscular endurance (AMRAP: +12 push-ups, TRT: +13 push-ups), and cardiovascular endurance (AMRAP: +10.7 ml/kg/min VO2 max, TRT: +12.4 ml/kg/min VO2 max). In addition, a significant reduction was shown in flexibility for both groups (AMRAP: -0.3 cm, TRT: -5 cm) following 6 weeks of training. Furthermore, no significant differences were observed between the AMRAP and TRT groups in any of the fitness components.

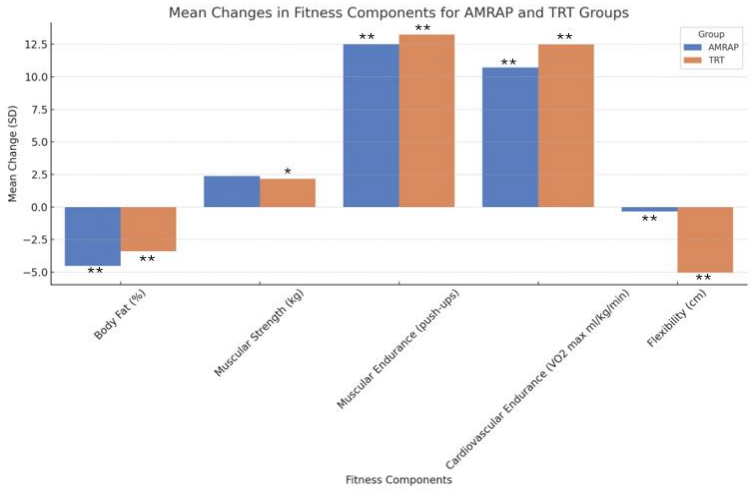

Fig. 1 Changes in fitness components pre- and post-intervention for AMRAP and TRT groups

(** significant difference between pre and post, $p < 0.01$; * significant difference between pre and post, $p < 0.05$)

The present study aimed to investigate the effects of two distinct training regimens, AMRAP (As Many Reps As Possible) and TRT (Traditional Resistance Training), on various fitness components over a six-week period. The results indicate significant improvements in several fitness domains within both groups, though no significant differences were found between the two training modalities. Both AMRAP and TRT groups exhibited significant reductions in body fat percentage, with the AMRAP group showing a decrease of 4.53% and the TRT group a decrease of 3.40%. These results are consistent with 185he185iouss research by Perez-Gomex [3], indicating that resistance training, regardless of specific protocol, can effectively reduce body fat by increasing metabolic rate and promoting lean muscle mass. The study found significant increases in muscular strength in both groups, with the AMRAP group improving by 2.37 kg and the TRT group by 2.16 kg. This finding aligns with existing literature which suggests that both high-intensity interval training (HIIT) and traditional resistance training can enhance muscular strength through neuromuscular adaptations and muscle hypertrophy [4].

In terms of muscular endurance, measured by the number of push-ups completed, both groups showed significant improvements. The AMRAP group increased by 12.50 push-ups, while the TRT group increased by 13.25 push-ups. These improvements may be attributed to the progressive overload principle employed in both training protocols, which is crucial for enhancing muscular endurance [5]. Significant enhancements in cardiovascular endurance, as measured by VO2 max, were observed in both groups. The AMRAP group demonstrated an increase of 10.71 ml/kg/min, while the TRT group showed an increase of 12.49 ml/kg/min. These findings support the notion that both resistance training and HIIT can improve cardiovascular fitness, likely due to increased cardiac output and oxygen utilization efficiency [5]. Interestingly, flexibility decreased in both groups, with the AMRAP group showing a reduction of 0.35 cm and the TRT group a reduction of 5.04 cm. This decline in flexibility might be due to the emphasis on muscle contraction and hypertrophy in resistance training, which can lead to reduced muscle elasticity if not complemented with adequate stretching routines [6].

IV. CONCLUSIONS

Overall, the results indicate that both AMRAP and TRT are effective in improving body composition, muscular strength, muscular endurance, and cardiovascular endurance, with no significant difference between the two protocols in any of the fitness components measured. This suggests that individuals can choose either training modality based on personal preference, accessibility, or specific fitness goals without compromising the effectiveness of their training outcomes.

The findings of this study underscore the effectiveness of both AMRAP and TRT in enhancing key fitness parameters over a relatively short training period. However, the decrease in flexibility observed in both groups highlights a potential area for further investigation and intervention. It is recommended that future studies incorporate flexibility training or dynamic stretching routines alongside resistance training programs to counteract the potential reduction in flexibility. Additionally, long-term studies should be conducted to assess the sustainability of these fitness improvements and their impact on overall health and functional abilities.

Future research could also explore the psychological and motivational aspects of AMRAP and TRT. Understanding how these training regimens influence adherence, motivation, and enjoyment could provide valuable insights for developing more effective and engaging fitness programs. Moreover, expanding the demographic scope to include various age groups, fitness levels, and health conditions could help in generalizing the findings and tailoring fitness interventions to broader populations.

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The Effect of AMRAP Training on Skill Performance Among Healthy Collegiate Students

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Abstract | In recent years, there has been a growing global concern over sedentary behavior due to its adverse effects on health and well-being. The As Many Reps/Rounds as Possible (AMRAP) training methodology, a key element of high-intensity interval training (HIIT) programs, has gained prominence in the fitness industry for its versatility, time efficiency, and significant health benefits. However, research on the impact of AMRAP training on skill performance components among students is limited. This study aimed to examine the effects of AMRAP training on speed, agility, power, and balance in healthy collegiate students. A total of 24 healthy collegiate students (17 males, 7 females) aged 20-21 years participated in the study. Participants were randomly assigned to either an AMRAP or Traditional Resistance Training (TRT) group for six weeks. The AMRAP group performed exercises designed to maximize repetitions or rounds within a specified timeframe, while the TRT group followed a conventional resistance training protocol. Both groups trained three times per week at 60%-67% of maximum heart rate. Skill performance components were assessed using standard protocols: speed was measured with a 30m dash, agility with a T-test, power with a vertical jump test, and balance with a stork stand test. Statistical analysis was conducted using paired t-tests to compare pre-and post-intervention results within groups and independent t-tests to compare differences between groups. Both groups showed significant speed improvements (AMRAP: -0.14s, TRT: -0.36s), agility (AMRAP: -3.31s, TRT: -2.91s), power (AMRAP: +4.2cm, TRT: +4.66cm), and balance (AMRAP: +2.65s, TRT: +11.24s). No significant differences were observed between the AMRAP and TRT groups in all skill performance components except for balance ($p < 0.05$) with the TRT group showing a more substantial improvement compared to the AMRAP group. This may be due to the nature of traditional resistance training, which often includes more static and controlled movements that require stabilization and balance, thus providing greater balance training stimuli compared to the more dynamic and rapid movements characteristic of AMRAP. In conclusion, these findings suggest that AMRAP can be an effective alternative to traditional resistance training, especially for those seeking time-efficient workout options. Traditional resistance training might be more beneficial for enhancing balance.

Keywords: *AMRAP training, agility, collegiate students, power, speed.*

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I. INTRODUCTION

The physical fitness of collegiate students is an area of growing interest, especially in light of the increasing prevalence of sedentary behavior and its negative impact on health and well-being. Speed, agility, power, and balance are critical fitness components that contribute to overall athletic performance and daily functional activities. High-intensity interval training (HIIT), particularly the As Many Reps/Rounds as Possible (AMRAP) methodology, has gained popularity due to its effectiveness, time efficiency, and broad applicability [1]. However, there is a paucity of research examining the effects of AMRAP training on these specific fitness variables among healthy collegiate students [2]. This study aims to explore the impact of AMRAP training on speed, agility, power, and balance in this population.

II. METHODS

A total of 24 healthy collegiate students (17 males, 7 females), aged 20-21 years, participated in the study. Participants were randomly assigned to either an AMRAP or Traditional Resistance Training (TRT) group for six weeks. The AMRAP group engaged in exercises aimed at maximizing repetitions or rounds within a specified timeframe, while the TRT group followed a conventional resistance training protocol. Both groups trained three times per week at 60%-67% of their maximum heart rate.

The fitness components were assessed using standard protocols: speed was measured using a 30m dash, agility with a T-test, power with a vertical jump test, and balance with a stork stand test. These assessments provided a comprehensive evaluation of the impact of the training regimens on the key fitness variables of speed, agility, power, and balance.

III. RESULTS AND DISCUSSION

Statistical analysis was conducted using paired t-tests to compare pre- and post-intervention results within groups, and independent t-tests to compare differences between groups. Figure 1 showed both groups displayed a significant improvement in speed (AMRAP: -0.14s, TRT: -0.36s), agility (AMRAP: -3.31s, TRT: -2.91s), power (AMRAP: +4.2cm, TRT: +4.66cm), and balance (AMRAP: +2.65s, TRT: +11.24s) following 6 weeks of training. Furthermore, no significant differences were observed between the AMRAP and TRT groups in any of the skill performance components.

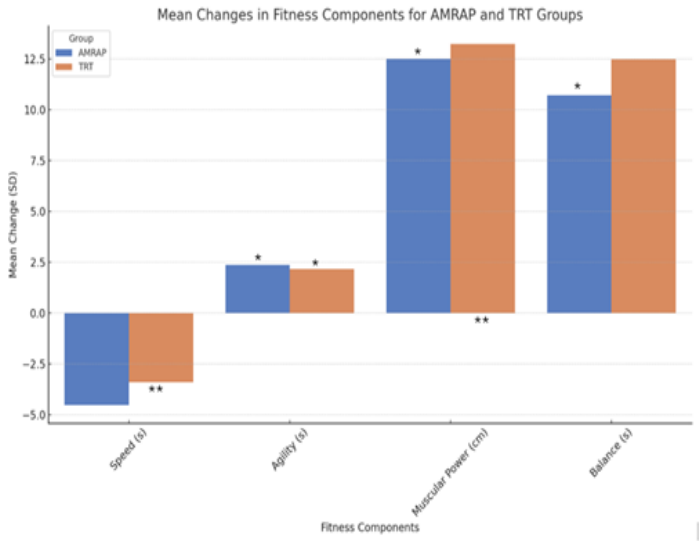

Fig. 1 Changes in fitness components pre- and post-intervention for AMRAP and TRT groups
(** significant difference between pre and post, $p < 0.01$; * significant difference between pre and post, $p < 0.05$

The present study aimed to evaluate the impact of AMRAP (As Many Reps/Rounds as Possible) and Traditional Resistance Training (TRT) on key fitness components which are speed, agility, muscular power, and balance among healthy collegiate students. Both training protocols demonstrated significant improvements across various fitness domains, though no significant differences were observed between the two groups for most measures.

Both the AMRAP and TRT groups showed significant reductions in sprint times, indicating improvements in speed. The AMRAP group decreased by 4.53 seconds, and the TRT group by 3.40 seconds. These findings are consistent with previous research highlighting the efficacy of HIIT using AMRAP and resistance training in enhancing anaerobic performance and speed [3]. Past study conducted revealed high-speed exercise could increase muscle strength by 10.20% which may lead to the improvement of speed performance [4]. Pareja-Blanco et al. found that repeating resistance training at the maximum velocity, compared with half-maximal concentric velocity, provided a superior stimulus for inducing neuromuscular adaptations, thus improving athletic performance [5].

Significant improvements in agility were noted in both groups, with the AMRAP group improving by 2.37 seconds and the TRT group by 2.16 seconds. These results align with studies suggesting that both AMRAP and traditional resistance training can enhance neuromuscular coordination and reaction times, leading to better agility performance [2]. The study observed substantial gains in muscular power, measured by vertical jump height, in both groups. The AMRAP group showed an increase of 12.50 cm, while the TRT group improved by 13.25 cm. These increases are indicative of enhanced explosive strength, which is a critical component of athletic performance and can be significantly improved through both AMRAP and resistance training [6]. Balance also improved significantly in both groups, with the AMRAP group showing a 10.71-second increase in single-leg stance time, and the TRT group demonstrating a 12.49-second increase. Basically, every human body has been equipped with the basic ability of sensors to maintain balance so that everyone is able to maintain their body balance simply in daily movements because there are three nervous systems that maintain human balance, namely sensory, central nerve and motor nerve [7] such as walking, running, pushing, jumping and others. This movement can help develop one's balance [2]. In both interventions, the exercise model movement using AMRAP and resistance training

media is expected to improve balance, abdominal muscle strength and core muscle endurance, including sit ups, push ups, squats and others. These movements are variations of contact point movements and movements for 6 weeks.

Overall, the results of this study indicate that both AMRAP and TRT are effective in improving speed, agility, muscular power, and balance among healthy collegiate students. Despite the significant within-group improvements, the lack of significant differences between the groups suggests that both training protocols are equally effective.

IV. CONCLUSIONS

The findings of this study underscore the efficacy of both AMRAP and TRT training regimens in enhancing critical fitness components such as speed, agility, muscular power, and balance in healthy collegiate students. These results provide valuable insights for fitness professionals and athletes, indicating that either training method can be effectively employed to achieve substantial fitness gains.

Given the observed improvements, future studies should aim to explore the long-term sustainability of these benefits and investigate the underlying mechanisms driving these adaptations. Additionally, examining the psychological aspects, such as motivation and adherence associated with each training protocol, could provide a more holistic understanding of their overall effectiveness. Incorporating larger and more diverse populations, including different age groups and fitness levels, would also enhance the generalizability of the findings.

Furthermore, future research could investigate the combination of AMRAP and TRT with other training modalities, such as flexibility or cardiovascular exercises, to develop comprehensive training programs that address multiple aspects of fitness simultaneously. Such integrative approaches could potentially mitigate the observed reductions in flexibility and further optimize overall fitness outcomes.

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The Effect of Physical Activity on Cognitive Function on Young Adults Among UiTM Seremban 3

Naimi Sahira, Nurun Naja, Nur Najihah, Akif Saat, Muhammad Taufiq, and Sharifah Maimunah Syed Mud Puad*.

Abstract | In the demanding landscape of university life, where sleep deprivation and mental exhaustion are commonplace, this study explores whether physical activity could be a game-changer for students, enhancing both academic success and overall well-being. Could physical activity be key to unlocking more significant cognitive potential and ensuring restorative sleep? Purpose: Although exercise and sleep quality are associated with cognitive function, their beneficial effects on cognitive function remain unclear. This study examines the impact of physical activity on sleep quality and cognitive function. Methods: 26 healthy young adults (age 22.3 ± 1.04 years) participated in this study. The Exercise amount was assessed using a uniaxial accelerometer. This study evaluated physical activity and sleep quality by actigraphy. Cognitive function was tested using the N-back task and the Wisconsin Card Sorting Test (WCST).Results: There were no significant associations between physical activity and sleep quality (B = -2.63e-4, p = 0.616), N-back task performance (B = -2.84e-4, p = 0.670), or WCST performance (B = -2.61e-5, p = 0.679), while sleep quality was significantly associated with N-back task performance (B = 0.540, p = 0.030) but not WCST performance (B = 0.0401, p = 0.097). Conclusion: Physical activity was not significantly associated with sleep quality or cognitive function. However, sleep quality was positively associated with working memory performance, suggesting that better sleep quality may enhance cognitive abilities in specific domains.

Keywords: *Physical activity, accelerometer, N-Back Test, working memory, Wisconsin Sorting Card test (WCST), executive function.*

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I. INTRODUCTION

The dynamic and intellectually stimulating atmosphere of a university campus, populated by young adults, provides an optimal setting to examine the potential cognitive benefits of physical activity. This study aims to investigate and comprehend the impact of physical activity on cognitive function among young adults enrolled at Universiti Teknologi MARA (UiTM) Seremban 3.

II. METHODS

A cross-sectional correlational research design was employed to examine this relationship in a sample of 26 conveniently selected, healthy students representing various faculties within the university. Participants (age 22.3 ± 1.04 years) underwent cognitive assessments using the Wisconsin Card Sorting Test (WCST) and the N-Back Test, while physical activity levels were measured using an accelerometer (Actigraph) over a seven-day period.

III. RESULTS AND DISCUSSION

There was no significant correlation between levels of physical activity and cognitive function. For working memory, N-Back test (B = -2.84e4, p = 0.670), and executive function, the WCST test (B = -2.61e5, p = 0.679). There is insufficient evidence to support the association between physical exercise and cognitive performance in young to middle-aged individuals, according to some studies [1], whereas other studies have found a strong positive correlation [2]. Even though physical activity, sleep, and nutrition may not be reliable indicators of cognitive function in young and middle-aged individuals, according to some studies [3]. It suggests that while students may not exercise frequently, the pressures of college life, such as time management and presentations, may aid in the improvement of their working memory and executive function [4].

TABLE I
LINEAR REGRESSION TABLE

	Linear Regression Analysis	
	b	***p***
N-Back	Mean Correct %	
Physical Activity	-284e-4	0.670
WCST	z-axis WCST	
Physical Activity	-2.61e-5	0.679

IV. CONCLUSIONS

Despite the study showing that university students' physical activity levels on cognitive performance, working memory, and executive function were performed not that well, because there were also other factors, it emphasizes the importance of prioritizing healthy sleep habits for students to achieve optimal academic performance and overall well-being. Future studies should employ larger sample sizes for cognitive evaluations, and greater sample numbers to fully clarify this association.

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The Effect of Physical Activity on Sleep Quality Among UiTM Seremban 3 Students

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Abstract | Good physical activity enhances sleep quality. The main purpose of this study is to investigate the effect of physical activity on sleep quality among UiTM Seremban 3 students. It aims to identify key factors contributing to better sleep quality, such as being physically active and having an active lifestyle. Using a Cross-sectional design of a waist-worn accelerometer (Actigraph GT3X+), the study investigates the effect of physical activity on sleep quality among UiTM Seremban 3 students (n=26, age 22.3 ± 1.04) through descriptive analysis and simple linear regression. The study revealed that 38% of 26 participants showed poor physical activity results, with only 8% having a good physical activity level. In addition, 58% experienced average sleep quality, while only 12% experienced good sleep quality. Physical activity has an insignificant effect on sleep quality (Simple Linear Regression = 0.671, $p < 0.05$). It showed that physical activity has no impact on sleep quality. In conclusion, the majority of students experience a lack of physical activity due to their hectic lifestyles, which results in low physical activity. It is suggested that good physical activity will help you have great sleep quality.

Keywords: *Accelerometer, sleep quality, physical activity.*

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I. INTRODUCTION

There are many kinds of physical activity, such as aerobic, anaerobic, mild, moderate, and vigorous exercises. Anaerobic exercises like weightlifting develop muscular strength, whereas aerobic exercises like walking and cycling improve cardiovascular endurance. Walking casually is considered a light activity. In contrast, moderate and intense activities cause a noticeable rise in heart rate and respiration [1].

Exploring how exercise affects university students' sleep quality revealed that thoughtful thinking and mindfulness were involved in a chain reaction [2]. This study advanced our theoretical knowledge of the factors influencing university students' sleep quality. It offered helpful guidance to educators and students on increasing sleep quality by engaging in physical activity. Furthermore, investigated the effect of physical activity on improving sleep quality among young adults, emphasizing the significance of being physically active in enhancing sleep outcomes [3].

In Addition, several factors influence sleep quality in young adults, including lifestyle habits, environmental conditions, and psychological well-being. Lifestyle choices such as irregular sleep schedules, excessive use of electronic devices before bedtime, and consumption of caffeine or alcohol can significantly impair sleep quality [4]. A previous study found that the use of electronic media in the evening is associated with delayed sleep onset and reduced sleep duration, highlighting the impact of technology on sleep patterns [5].

Conclusion, engaging in different types of physical activity, such as aerobic and anaerobic exercises, has numerous health benefits including improved cardiovascular health, metabolic function, and mental well-being. Health organizations provide guidelines for the optimal amount of physical activity, and lack of sleep can have negative effects on overall health and well-being. Factors such as lifestyle habits and the use of electronic devices can impact sleep quality in young adults.

II. METHODS

This study involved a total of twenty-six ($N = 26$) UiTM Seremban 3 students aged (22.3 ± 1.04) years old. The inclusion criteria for the potential participant were include healthy, not under medication.

A. Instruments

i. Physical Activity and Sleep Quality

The participants wore an ActiGraph GT3X+ on their waist which was performed over 5−7 days. This research measured total sleep time (TST), sleep efficiency, bedtime, and wake-up time. The actigraph unit was worn around the waist. This analysed actigraphy data using the algorithm supplied by the ActionW-2 clinical sleep analysis software package for Windows (Ambulatory Monitoring Inc.) and a sleep diary. Sleep and activity levels were scored according to the Cole-Kripke formula.

B. Statistical Analysis

Statistical analysis was carried out using Jamovi version 2.4.8. Regression analysis was used to examine the effect of physical activity on sleep quality. Statistical significance level was accepted at $p < 0.05$.

III. RESULTS AND DISCUSSION

Among students at UiTM Seremban 3, an insignificant effect of physical activity of sleep quality among UiTM Seremban 3 students has been established using simple linear regression analysis. The result is presented in Table 1, the simple Linear Regression was conducted to see if there was any significant effect of physical activity on sleep quality among UiTM students. Table 1 shows that there is no significant difference of physical activity on sleep quality $p = 0.671$. In addition, the researcher failed to reject the null hypothesis.

TABLE 1
LINEAR REGRESSION

Predictor	**SE**	***t***	***p***	***Stand. Estimate***
Sleep quality	256	-0.431	0.671	-0.087

The result achieved from Simple Linear Regression stated that there was no significant effect physical activity on sleep quality among UiTM Seremban 3 students. This finding is similar to previous study which suggests that physical activity is negatively associated with sleep quality in college students, indicating that physical activity may not significantly impact sleep quality among university students [6].

This result shows that there is a complex interaction between physical activity and sleep quality that is affected by several factors. Firstly, the length of the workouts may be different through students, some may work out for just ten minutes, while others may work out for longer. Exercise schedule is also very important. Exercising too soon before bed can raise body temperature and heart rate, which makes it more difficult to fall asleep. These variations make it difficult to conclude the overall effect of physical activity on sleep quality.

Other than that, the research also discovered that students' academic commitments, especially around exam times, frequently have an impact on physical activity. It is because they prioritised academic study rather than being physically active during the day. Even though past research shows that if an individual is physically active late at night, such as playing futsal or badminton, the time they spend might be close to bedtime, which can affect their sleep time and affect their next day routine [7].

IV. CONCLUSIONS

The results from the simple linear regression analysis indicated that there was no significant effect of physical activity on sleep quality among UiTM Seremban 3 students. This finding aligns with previous research suggesting that physical activity may not significantly impact sleep quality among university

students [4]. These findings highlight the need for a deeper understanding of how various elements interact to influence sleep quality. They also underscore the importance of considering individual differences and external pressures when evaluating the impact of physical activity on sleep. Future interventions aimed at improving sleep quality in university students should adopt a total approach, not only physical activity but also academic workload, stress management, and overall lifestyle.

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The Effect of Reception Quality on the Selection of Setting Zone

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Abstract | In volleyball, reception is the first action, followed by setting. The quality of reception is crucial for winning a volleyball match because it can affect setting zone selection. This study aimed to determine the effect of reception quality on the selection of setting zones in volleyball. A total of 64 matches from the top four teams in two tournaments were selected: Sooka Super Series Volleyball 2022 (n = 32) and the PKNS Invitational Volleyball League 2023 (n = 32). Reception quality was categorized using a 5-point numerical rating scale, ranging from 0 to 4 (0 = no reception/error, 1 = poor, 2 = average, 3 = good, 4 = excellent). Next, setting zone selection was categorized according to the consequent attacking areas in zones 1, 2, 3, 4, 5, and 6. Results showed that out of 24 variables of reception quality on the setting zone between Sooka Super Series Volleyball 2022 and the PKNS Invitational Volleyball League 2023, there are 14 variables that had significant differences ($p < 0.05$). The Sooka Super Series Volleyball had higher scores in reception quality (4), while the PKNS Invitational Volleyball League 2023 had higher scores in reception quality (3). This difference is attributed to the presence of professional teams that have raised the level of play to a higher level in terms of reception. This is likely due to their technique of keeping their arm platform parallel to the floor during contact with the ball. In both tournaments, setting zone 4 was the most frequently selected setting zone. Thus, zone 4 is considered the best option for attack zones due to the ample space it provides for attackers to perform spikes.

Keywords: *Volleyball, reception quality, setting zone.*

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I. INTRODUCTION

Volleyball is a dynamic sport characterized by fast-paced action and complex movements, with each team comprising six players who employ techniques such as serving, reception, setting, spiking, and blocking [1]. Effective teamwork is crucial, as players must communicate and coordinate their actions to execute plays and overcome opponents. Beyond skill techniques, understanding court zones is also vital, as the required abilities and actions during competition depend significantly on a player's position on the court [8]. Among these techniques, spiking is essential for quickly securing points, while the effectiveness of reception plays a significant role in determining match outcomes [6]. Setting, which follows reception, is crucial for the success of subsequent actions and influences the final game result [5]. This interdependence highlights that spiking effectiveness relies on the quality of the set, which in turn depends on the quality of reception. Reception, as the initial action in volleyball, is fundamental for enabling organized play and facilitating powerful attacks, although it may affect game continuity. The quality of reception directly impacts the effectiveness of subsequent attacks [4]. This study explores the relationship between reception quality and setting zone selection, aiming to elucidate how effective reception can guide strategic setting decisions and thereby influence overall game performance.

II. METHODS

This study analyzed a total of 64 matches from two volleyball tournaments: 32 matches from the Sooka Super Series Volleyball 2022 and 32 matches from the PKNS Invitational Volleyball League 2023. All video recordings were of full matches, with durations ranging from 50 to 120 minutes. Prior to analysis, the video footage was meticulously identified and collected. Nacsport Video Analysis Software was employed for the analysis. Reception quality was assessed and categorized using a 5-point numerical rating scale, where performance was rated from 0 to 4 (0 = error, 1 = poor, 2 = average, 3 = good, 4 = excellent). Additionally, setting zones were analyzed and categorized based on the subsequent attacking areas: zone 1 (right-back), zone 2 (right-front), zone 3 (middle-front), zone 4 (left-front), zone 5 (left-back), and zone 6 (middle-back) [1]. Statistical analysis was used to describe the demographic data, with descriptive statistics detailing reception quality in relation to setting zone selection. To compare reception quality across different setting zones in the Sooka Super Series Volleyball 2022 and the PKNS Invitational Volleyball League 2023, an independent t-test was conducted. The analysis was performed using Jamovi version 2.3.28.0, with a significance level set at $p < 0.05$.

III. RESULTS AND DISCUSSION

According to Table 1, the independent t-test analysis revealed significant differences in 14 out of 24 variables related to reception quality and setting zone selection between the Sooka Super Series Volleyball 2022 and the PKNS Invitational Volleyball League 2023 ($p < 0.05$). The remaining ten variables did not show significant differences, as their p-values were greater than 0.05. Additionally, Figure 1 presents a bar graph illustrating the reception quality and setting zone selection for both the Sooka Super Series Volleyball 2022 and the PKNS Invitational Volleyball League 2023.

TABLE 1
ANALYSIS OF RECEPTION QUALITY AND SETTING ZONE

Variable Reception Quality	Setting Zone	Tournament	*t*	*df*	*p*	Mean	SD
Poor	2	SOOKA	3.178	62	0.002*	1.844	0.805
		PKNS				1.156	0.920
Average	1	SOOKA	-2.844	62	0.006*	3.625	1.233
		PKNS				2.875	1.238
	2	SOOKA	-4.200	62	< 0.001*	2.900	1.208
		PKNS				1.531	1.233
	4	SOOKA	-4.636	62	< 0.001*	3.375	2.664
		PKNS				1.000	0.775
	6	SOOKA	-7.459	62	< 0.001*	2.500	1.531
		PKNS				1.156	0.975
Good	1	SOOKA	-9.178	62	< 0.001*	9.156	3.488
		PKNS				3.500	1.248
	2	SOOKA	-8.446	62	< 0.001*	12.063	2.662
		PKNS				2.875	1.282
	4	SOOKA	6.449	62	< 0.001*	11.750	4.141
		PKNS				1.406	1.564
	6	SOOKA	-4.449	62	< 0.001*	11.688	3.508
		PKNS				3.000	1.312
Excellent	1	SOOKA	11.923	62	< 0.001*	7.406	1.391
		PKNS				3.250	1.363
	2	SOOKA	20.292	62	< 0.001*	9.813	1.593
		PKNS				3.250	1.525
	4	SOOKA	20.449	62	< 0.001*	7.813	1.551
		PKNS				2.063	1.093
	6	SOOKA	3.215	62	0.002*	4.438	1.480
		PKNS				3.281	1.397

*$P < 0.05$

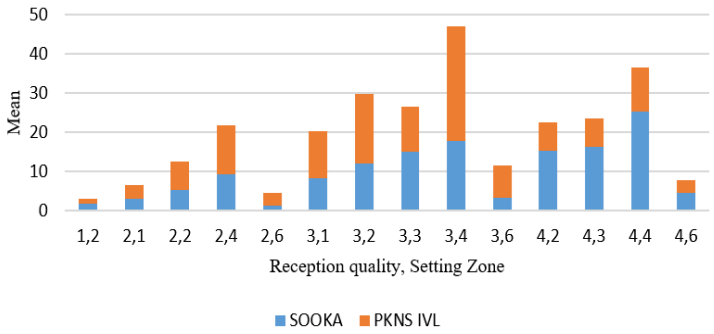

Fig. 1: Comparison between Sooka Super Series Volleyball 2022 and PKNS IVL 2023 on reception quality and setting zone

The study's findings indicate that the Sooka Super Series Volleyball tournament demonstrated superior reception quality compared to the PKNS Invitational Volleyball League, as evidenced by a higher frequency of excellent receptions (4) in the Sooka Super Series. In contrast, the PKNS Invitational League exhibited a higher frequency of good receptions (3). Despite these differences, the most frequently selected setting zone in both tournaments was zone 4 (left-front), consistent with previous research that identifies zone 4 as the dominant setting zone [7]. The setter's strategy often involves targeting the left side of the net to counteract the opponent's blocking strategy [1]. Additionally, zone 4 is considered a safe attack zone, providing the left outside hitter—typically viewed as a reliable player—with ample space to perform spikes.

Previous studies suggest that higher levels of competition correlate with improved reception performance [3]. Enhanced upper limb strength contributes to better arm positioning during ball contact and more accurate reception techniques. Conversely, uncontrolled movements or improper arm positioning can lead to errors, underscoring that athletes with greater motor control and precision tend to perform better in serve reception. Additionally, professional players have been found to exhibit less variability and greater sagittal symmetry in their receptions compared to amateur players. Professionals consistently maintain their arm platform parallel to the floor during contact, a technique less frequently employed by amateurs [2].

IV. CONCLUSIONS

The significant differences in reception quality and setting zone selection observed in this study provide valuable insights into volleyball gameplay dynamics. The findings emphasize the critical role of strong reception skills in facilitating effective offensive plays and reveal tactical variations between the Sooka Super Series and the PKNS Invitational. These insights can inform coaching strategies and training programs, enabling teams to enhance performance by prioritizing reception quality and optimizing setting strategies to capitalize on their players' strengths.

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The Effect of Sleep Quality on Cognitive Functions Among Young Adult in UiTM Seremban 3

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Abstract | Both physiological and psychological processes are improved by having good sleep quality. Though good sleep is crucial, young people frequently struggle with it as a result of the modern lifestyle. The objective of this study is to identify the sleep quality, level of cognitive function and whether sleep quality influences cognitive functions among young adults in UiTM Seremban 3. A total of 27 students from UiTM Seremban 3 were selected, and the data were collected over 7 days using protocol testing by [3] Accelerometers were used to assess participants' sleep quality, while N-Back tasks for working memory and Wisconsin Card Sorting Test (WCST) for executive function were used to assess the cognitive function of participants. Linear regression was used to analyse the correlation between sleep quality, working memory, and executive function. Reports from 26 young adults in UiTM Seremban 3 (22.3 ± 1.04 years) indicate a higher prevalence of moderate sleep quality (6.13 ± 1.044) and cognitive function for N-Back Test (78.3 ± 4.22) and WCST (-0.236 ± 0.4559). The findings show that the correlation between sleep quality and working memory is a significant correlation ($\beta = 0.540$; $p = 0.030$), while the correlation between sleep quality and executive function shows no significant correlation ($\beta = 0.120$; $p = 0.097$). These findings demonstrated sufficient evidence that sleep quality affects working memory ($p < 0.05$) but not executive function. Hence, sleep quality is associated with better cognitive performance of working memory in young adults.

Keywords: *Sleep quality, cognitive function, working memory, executive function, young adult, accelerometer.*

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I. INTRODUCTION

Sleep is essential during the whole life cycle, especially for those young adults, who are in a formative period of growth. Other than that, getting enough sleep is essential for memory consolidation [6]. The majority of studies back up the assumption that sleep is essential for maintaining cognitive capacities like memory, concentration, and problem-solving skills. However, poor sleep quality and sleep deprivation have been reported among young adults due to the modern lifestyle and 24-hour culture of connectivity and media consumption [4]. College offers a level of personal freedom that many young people have never known before. Many college students prefer to have irregular sleep patterns, maybe as a result of social and academic schedules [5]. Also, media usage (e.g., smartphone addiction, lying posture, midnight use, screen time), coffee, and stimulant use all had a negative impact on sleep [8]. In addition, the main purpose presented in this paper was to investigate the effect of sleep quality on cognitive function among the young adult population.

II. METHODS

This study involved a total of twenty-seven ($N = 27$) students from UiTM Seremban 3, age (22.3 ± 1.04) years old. All the subjects were physically healthy and showed no signs of any chronic disease and were confirmed by a medical doctor. Before the study started, a consent form was given to each participant, and they were thoroughly informed about the study's purpose, testing procedures, associated risks, and benefits for participating. Every procedure was approved by the institution's ethics committee. Every questionnaire was completed by participants.

A. Assessment of Sleep Quality

Accelerometer was used to measure sleep quality. They function by tracking the body's motions during the night and offering information into sleep/wake patterns, sleep duration, and efficiency. They are also able to measure the frequency and intensity of the movements as you sleep. The accelerometer will record the bedtime, wake-up time, total sleep time (TST), and sleep efficiency (defined as TST/time in bed × 100) of each participant [3]. All participants wear the accelerometer on their waist for about 7 days without taking out the device for 24 hours (except while bathing).

B. Assessment of Cognitive Functions

All the cognitive function tests were conducted every night at 10 p.m. until 12 a.m. Participants answered the test within the time given. The N-Back tests were given to the participants in order to assess their working memory. The N-Back test is a computer software test in which participants must respond to prior stimulus numbers (0-Back, 1-Back, and 2-Back conditions) while continuously updating their mental set [7]. This test comprised 25 trials. To complete the test, participants had to keep an eye on a sequence of numerical stimuli and determine when a given number was identical to one that had already been presented [3]. Performance was measured as %correct (2-back test = the number correct/25 × 100).

The Wisconsin Sorting Card Test (WSCT) was used to measure executive functions such as the ability to change cognitive strategies in a changing environment. WCST is a computer software test that requires participants to correctly match each response card with one of four stimulus cards using the feedback that was given (right or incorrect) [7].

C. Statistical Analysis

Jamovi 2.3.28 was used for statistical analysis. All results are presented as mean ±SD. The level of sleep quality and cognitive function were performed using descriptive analysis, while the effect of sleep quality on cognitive function was investigated using linear regression analysis. A level of $p < 0.05$ was decided by considering statistical significance for linear regression.

III. RESULTS AND DISCUSSION

Based on Table 1, linear regression analysis showed sleep quality was significantly correlated with working memory test ($\beta = 0.540$; $p = 0.030$), but sleep quality was not significantly correlated with executive function because the p value is more than 0.05. Next, figure 1 shows an example of a scatter plot that illustrates the correlation between the outcomes of the N-Back test and sleep quality.

TABLE 1
CORRELATION OF SLEEP QUALITY AND COGNITIVE FUNCTIONS

	Sleep Quality	
	β	***P***
N-Back score	0.540	0.003*
Wcst Score	0.120	0.097

*Note: *= show significant, p < 0.05*

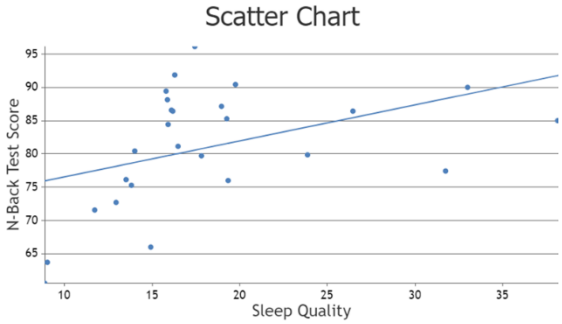

Fig. 1: Scatter Plot of Sleep Quality and Working Memory

This study's findings, which show a connection between working memory and sleep quality, largely match those of other research in this area of study [7]. Sleep quality had an impact on the performance of N-back activities since the test load developed from 1-Back to the 2-back condition and

increased mental effort [2]. Moreover, sleep duration may affect these outcomes when the test load was difficult [3]. Furthermore, according to a past study [4] participants' working memory declines as a result of their complete lack of sleep. However, executive function is not impacted by the quality of sleep. The findings of this study contradict those of multiple other studies that suggest that the quantity and quality of sleep has effect on executive function. Other past studies stated that other factors like education play a more significant role [1].

IV. CONCLUSIONS

The quality of sleep was found to be strongly correlated with working memory but not with executive function. Our results suggest that sleep plays a significant role in developing the greatest potential cognitive performance in working memory, which is crucial for young adults. In addition, a greater understanding of the significance of sleep could help in the early detection and management of issues to prevent more serious outcomes.

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The Effects of Carbohydrate, Caffeine, L-Menthol, and Combination (Carbohydrate + Caffeine + L-Menthol) Mouth Rinsing on Intense Intermittent Exercise Performance

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Abstract | Mouth rinsing with solutions containing carbohydrates (CHO), caffeine (CAF) and L-menthol (MEN), has been suggested to enhance exercise performance by providing ergogenic effects through various mechanisms such as oral sensing and improved perceptual responses. However, the individual and combined impacts of these substances on high-intensity intermittent exercise remain unclear. This study aimed to address this research gap by examining the effects of CHO, CAF, MEN, and their combination (CHO+CAF+MEN; MIX) on exercise performance, heart rate (HR), and rating of perceived exertion (RPE) in recreationally active young men. Eighteen participants (mean ± SD: (mean ± SD: age 22 ± 2 years, body mass 62 ± 7 kg, height 168 ± 0.06 cm, VO2 max 48 ± 3 mL/kg/min) underwent a randomized, double-blind, placebo-controlled crossover study involving six trials with different mouth rinse conditions. Results indicated that CHO mouth rinsing significantly enhanced performance in the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) test compared to placebo (PLA) and control (CON) (CHO: 1440 ± 288 m vs. PLA: 1383 ± 282 m, and vs. CON: 1373 ± 282 m; both $p < 0.05$), but not when compared to other rinses. RPE values for the CHO condition were significantly lower than PLA and CON during the Yo-Yo IR1 tests ($p < 0.05$). No significant differences in HR were observed among the conditions. These findings suggest that CHO mouth rinsing can enhance intermittent exercise performance, possibly by reducing perceptual effort, offering a practical strategy for athletes and active individuals.

Keywords: *Mouth rinsing, carbohydrate, caffeine, L-menthol, exercise performance.*

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I. INTRODUCTION

Recent research suggests that mouth rinsing with carbohydrate (CHO), caffeine (CAF), or L-menthol (MEN) solutions can enhance exercise performance and affect physiological responses [1]. However, the independent and combined effects of these substances on high-intensity intermittent exercise remain unclear [2]. This study aims to assess the separate and combined impacts of mouth rinses containing CHO, CAF, MEN, and CHO+CAF+MEN (MIX) on performance during high-intensity intermittent exercise. The study will also examine changes in heart rate (HR) [3] and rating of perceived exertion (RPE) [4].

II. METHODS

Eighteen participants (mean ± SD: age 22 ± 2 years, body mass 62 ± 7 kg, height 168 ± 0.06 cm, $\dot{V}o_{2max}$ 48 ± 3 mL·kg·min^{-1}) underwent a randomized, double-blind, placebo-controlled crossover study involving 6 trials with different mouth rinse conditions, together with placebo (PLA) and control (CON).

III. RESULTS AND DISCUSSION

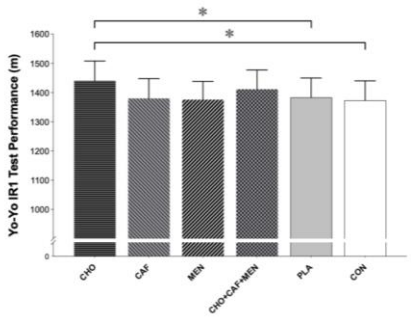

Fig. 1. The distance covered in the Yo-Yo IR1 between six different solutions (mean ± SEM).

Results indicated that CHO group significantly enhanced performance in the Yo-Yo intermittent recovery level 1 (Yo-Yo IR1) test [5] compared to PLA and CON (CHO: 1440 ± 288 m vs. PLA: 1383 ± 282 m, and vs. CON: 1373 ± 282 m; both $p < 0.05$), but not when compared to other rinses (Fig. 1). RPE for the CHO condition were significantly lower than PLA and CON during the Yo-Yo IR1 ($p < 0.05$) (Table 1). No significant differences in HR were observed among the conditions. The results support the previous study by [6], demonstrating that CHO enhances high intensity interval exercise. Additionally, CHO lowered RPE, consistent with previous findings by [7].

TABLE 1
RATING OF PERCEIVED EXERTION (RPE) DURING YO–YO IR1 BETWEEN SIX DIFFERENT SOLUTIONS (MEAN ± SD).

	CHO	CAF	MEN	CHO+CAF+MEN	PLA	CON
Warm-up	6.56 ± 0.7	7.22 ± 1.17	6.61 ± 1.09	7.06 ± 1.3	7.67 ± 1.37	7.17 ± 1.11
Level 5	6.78 ± 0.65	7.11 ± 1.08	7.28 ± 1.02	6.61 ± 0.78†	7.39 ± 0.92	7.02 ± 0.84
Level 9	6.44 ± 0.51*	7.22 ± 1.01	7.61 ± 1.54	7.94 ± 1.21	7.94 ± 1.59	7.22 ± 1.01
Level 11	7.56 ± 0.62†*	8.39 ± 1.15	8.67 ± 1.57	7.17 ± 1.47†*	8.94 ± 2.15	8.03 ± 0.59
Level 12	8.56 ± 0.77†*	9.17 ± 1.47	9.44 ± 2.18	9.28 ± 1.32	9.67 ± 2.11	9.72 ± 1.18
Level 13	10.56 ± 0.98†	11.11 ± 1.45	10.94 ± 1.73	11.39 ± 1.69	11.89 ± 2.25	10.67 ± 1.28
Level 14	11.67 ± 1.14†*	12.72 ± 1.53	13.1 ± 2.09	13.33 ± 1.88	13.17 ± 1.95	12.56 ± 1.46
80%max	18.1 ± 2.03†	18.22 ± 1.26	17.94 ± 1.63	18.67 ± 1.53	18.28 ± 1.56	18.44 ± 1.25
Exhaustion	18.39 ± 1.69†*	18.94 ± 1.63	19.5 ± 0.92	18.28 ± 2.22	18.22 ± 1.26	19.21 ± 0.94

Values are means ± SD. †Different from PLA, $p < 0.05$.
**Different from CON, $p < 0.05$.*

IV. Conclusion

CHO mouth rinses enhance exercise performance, possibly due to the lowering of perceptual effort during the intense intermittent exercise. CHO mouth rinsing could offer a convenient and effective strategy to enhance intermittent exercise performance and lower perceptual effort (i.e., central fatigue), making it a useful tool for athletes and active individuals.

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The Exploratory Study on Physical Fitness Benefits of Outdoor Recreation Activities Among Students in UiTM Puncak Alam

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Abstract | The study explored the physical fitness benefits of outdoor recreational activities among students at Universiti Teknologi MARA (UiTM) Puncak Alam, focusing on how often they participated, the benefits they perceived, and the obstacles they faced. A cross-sectional survey was conducted using a structured questionnaire distributed to 100 randomly chosen students, covering demographics, activity frequency, perceived benefits, and barriers. The data were analyzed using descriptive and inferential statistics, including t-tests and ANOVA. The results showed that 70% of students engaged in outdoor activities 2-4 times per month, mainly on weekends (73%), with an average frequency (f = 3.19). Significant physical benefits included maintaining health (p = 4.42), improving appearance (p = 4.26), staying slim (p = 4.23), and building strength (p = 4.17). Additional benefits included avoiding ill-health (p = 4.15), increasing endurance (p = 4.20), and enhancing agility (p = 3.95). High p-values indicated strong correlations between regular participation and enhanced physical health. Barriers to participating in outdoor recreational activities included the cleanliness and condition of recreation facilities (p = 4.35), lack of knowledge or skills (p = 4.14), safety concerns (p = 4.19), and logistical issues like travel time and distance (p = 4.24). The study concluded that outdoor recreational activities significantly benefit physical fitness and health, but barriers need to be addressed. Recommendations included improving facility conditions, increasing safety measures, and enhancing students' knowledge and skills to encourage participation, stressing the importance of supportive university policies to promote regular physical activity and reduce sedentary lifestyles, ultimately fostering a healthier student community

Keywords: *Physical activities, barriers, outdoor recreation.*

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I. INTRODUCTION

Outdoor recreational activities were recognized for their significant physical health benefits, especially for university students who often lead a sedentary lifestyle due to academic demands and digital engagement. The World Health Organization (2020) highlighted regular physical activity's importance in reducing risks of cardiovascular diseases, diabetes, and certain cancers, while enhancing musculoskeletal health and overall well-being. Recent research indicated that activities like hiking, cycling, and team sports improved fitness and decreased lifestyle-related health issues [1]. However, university students faced barriers such as time constraints, limited access to facilities, and social influences that hindered participation [2]. The benefits extended beyond physical health, improving mental well-being, social interactions, and academic performance [3]. Engaging in these activities helped establish lifelong health habits, which are crucial for university students. Benefits included enhanced cardiovascular fitness, muscle strength, endurance, flexibility, and balance [4]. Natural settings for these activities provided additional benefits like stress reduction and improved mood [5]. At UiTM Puncak Alam, promoting outdoor recreational activities was vital to counteract sedentary habits linked to health issues [6]. Outdoor recreational activities also fostered social connections and support networks, essential for well-being [7]. Hence, this study aimed to explore the physical benefits of these outdoor recreational activities and find ways to overcome participation barriers, emphasizing the need for targeted interventions and supportive environments in universities to promote healthier lifestyles.

II. METHODS

A. Research Design, Population, and Sampling

This study employed a predominantly quantitative research design using a cross-sectional survey method to assess the physical benefits of outdoor recreational activities among university students. The quantitative approach facilitated the collection and statistical analysis of numerical data, making it effective for identifying patterns, correlations, and relationships between variables related to students' physical health. Data were collected from a representative respondent of 100 undergraduate students enrolled in the Physical and Health Education (PHE) program at UiTM Puncak Alam through simple random sampling. This method ensured an equal opportunity for all students to participate, enhancing the representativeness and generalizability of the findings [8]. The survey captured current participation levels in outdoor activities, perceived benefits, and barriers to engagement, providing a comprehensive overview of these factors.

B. Research Instrumentation and Data Collection

The primary data collection tool was a structured questionnaire by the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). It was collected using online forms and comprised three sections: frequency of participation, perceived benefits, and barriers to participation. The latter two sections utilized a 5-point Likert scale to gauge the intensity of responses. The questionnaire aimed to quantify students' engagement in activities like hiking, cycling, and team sports, explore their perceived benefits to physical, mental, and

social well-being, and identify common barriers such as time constraints and access to facilities. To ensure reliability and validity, the questionnaire was pilot tested with 20 students, and Cronbach's Alpha was calculated for each section, showing satisfactory internal consistency. Ethical considerations included obtaining informed consent, maintaining participant confidentiality, and adhering to ethical standards throughout the study.

C. Data Analysis and Conclusion

Descriptive and inferential statistics were employed to analyze the collected data. Descriptive analysis provided numerical data on the demographic characteristics, participation frequencies, and perceived benefits and barriers, identifying trends and patterns. Inferential statistical data were used to test hypotheses and explore relationships between variables. These analyses revealed significant insights into the factors influencing students' engagement in outdoor recreational activities and highlighted areas for intervention. The study's methodology was rigorously designed to ensure data reliability and validity, supporting robust conclusions and actionable recommendations. The findings will inform strategies to promote outdoor recreational activities and enhance student health and well-being at UiTM Puncak Alam, contributing to a healthier university community [2].

III. RESULTS AND DISCUSSION

TABLE I
FREQUENCY OF STUDENT PARTICIPATION

		Frequency	Percent
Participation Time In a month	Less than 1 time per month	6	6
	2-4 times per month	70	70
	5 or more times per month	23	23
	Not sure	1	1
Participation time in the week	Weekdays	24	24
	Weeknights	3	3
	Weekends	73	73
Activities that participated	Walking	55	55
	Hiking	51	51
	Jogging	60	60
	Running	50	50
	Trail Run	25	25
	Brisk walking	42	42
	Biking	43	43
	Swimming	46	46
	Camping	58	58
	Wildlife watching	21	21
	Kayaking	40	40

The data reveals a high level of engagement in outdoor recreational activities among UiTM Puncak Alam students. The majority of respondents (70%) participate in outdoor recreational activities 2-4 times per month, while an additional 23% engage in these activities 5 or more times per month. This indicates that 93% of students are involved in outdoor activities at least a few times each month. This high level of participation underscores the importance of outdoor recreational activities as an integral part of the student lifestyle at UiTM Puncak Alam. Weekends are the most popular time for participation, with 73% of students engaging in outdoor recreational activities during this period. This preference likely stems from reduced academic commitments and increased free time on weekends. These findings align with previous research emphasizing the critical role of leisure time in promoting student well-being and overall health [2] [6]. Therefore, creating more opportunities for students to participate in outdoor recreational activities, particularly during weekends, is essential for fostering a healthy and active student community.

TABLE II
DESCRIPTIVE STATISTICS FOR PHYSICAL BENEFITS OF OUTDOOR RECREATION

	N	***Mean***	***SD***
Stay Slim	100	4.23	1.04
Avoid Ill-Health	100	4.15	0.83
Healthy Body	100	4.24	0.95
Build Strength	100	4.17	0.92
More Agile	100	3.95	1.06
Lose Weight	100	4.16	0.84
Increases Endurance	100	4.20	0.97
Improve Appearance	100	4.26	0.86
Muscles Develop	100	4.08	1.05
Maintain Health	100	4.42	0.89

The analysis indicates that students perceive several physical benefits from participating in outdoor recreational activities. High mean scores for variables such as staying slim (4.23), avoiding ill-health (4.15), having a healthy body (4.24), building strength (4.17), losing weight (4.16), increasing endurance (4.20), improving appearance (4.26), muscle development (4.08), and maintaining health (4.42) reflect a strong consensus among students about the positive impacts of these activities on their physical health. The consistency in responses, as indicated by the relatively low standard deviations, underscores the widespread recognition of these benefits. These results are consistent with findings from other studies that have documented the significant physical and psychological benefits of regular participation in outdoor activities [4] [9]. The positive perceptions of outdoor recreational activities highlight their role in promoting overall health and well-being, suggesting that universities should emphasize these benefits to encourage more students to engage in such activities.

TABLE III
DESCRIPTIVE STATISTICS FOR BARRIERS PARTICIPATION IN OUTDOOR RECREATION

	N	*Mean*	*SD*
Cleanliness and Condition of Recreation Facilities	100	4.35	1.04
Lack of Knowledge/Skills	100	4.14	1.02
Safety and Security of Recreation Areas	100	4.19	1.05
Time and Distance Required to Travel	100	4.24	0.98
Lack of Transportation	100	4.16	1.00
Time Constraints Due to Work, Family, or Other Obligations	100	4.13	1.05
Cost of Equipment/Gear Needed to Participate	100	4.12	1.10
Costs Associated with Entrance, Parking, or Other User Fees	100	4.16	1.01
Availability of Cell Phone/Wi-Fi Coverage	100	4.11	1.27
General Lack of Interest or Other Priorities	100	4.08	1.16

Several barriers to participation were identified through the data analysis. The cleanliness and condition of recreation facilities (4.35) emerged as significant deterrents. Students expressed concerns about the state of these facilities, indicating that poor maintenance discourages participation. Lack of knowledge or skills (4.14) was another notable barrier, with many students feeling unprepared to engage in outdoor recreational activities. Safety and security concerns (4.19) also significantly impacted participation, as students expressed apprehension about the safety of recreation areas. Logistical issues such as time and distance required to travel (4.24,) were frequently cited, suggesting that accessibility is a major challenge. Financial barriers, including the cost of equipment/gear (4.12) and costs associated with entrance, parking, or other user fees (4.16), were also significant. Additionally, time constraints due to work, family, or other obligations (4.13) and the availability of cell phone/Wi-Fi coverage (4.11) were identified as barriers. Addressing these barriers is crucial for increasing participation in outdoor recreational activities [4].

IV. Conclusions

This study illustrated the important roles that outdoor recreational activities play in improving the physical health of students at UiTM Puncak Alam. The high rates of participation and the perceived benefits reflected a strong and significant appreciation for these activities. Students receive enhancements in cardiovascular fitness, increased physical activity, and overall well-being. Additionally, the students acknowledged improvements in mental health, such as reduced stress and anxiety and better mood and cognitive function. These findings highlighted the necessity of integrating outdoor recreational activities into university wellness programs to promote a comprehensive approach to student's health. Despite the recognized benefits, several barriers hindered full engagement in these activities, such as a lack of peer support, social pressures, and perceived irrelevance or disinterest. Targeted interventions to address these barriers were essential for improving participation and student well-being.

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The Relationship Between Human Resources Management Practices (HRMp) and Employee Engagement Among Staff at Universiti Putra Malaysia (UPM) Sports Centre

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Abstract | This investigation examined the correlation between Human Resources Management (HRM) methodologies and workforce engagement among University Putra Malaysia (UPM) Sport Centre personnel. The primary goal of this research was to assess the effect of HRM practices on employee involvement. A quantitative methodology was employed, utilizing surveys distributed to 40 staff members. These surveys included questionnaires that assessed HRM practices and employee engagement. The results revealed high scores for HRM practices, particularly in performance appraisal (M = 3.96) and employee involvement (M = 3.95). Employee engagement levels also demonstrated a high score, with vigor recording the highest score (M = 4.44). Overall, there is a significant positive relationship between HRM practices and employee engagement ($r = 0.662$, $p < 0.001$). The results imply that efficient HRM practices are pivotal in cultivating employee engagement within the sports center environment. This study advances the understanding of the impact of HRM on employee engagement within university sports institutions and offers valuable insights for enhancing organizational strategies and outcomes

Keywords: *Human resources management practices, employee engagement.*

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I. Introduction

Human resources management (HRM) is an essential department in an organization that plays a huge role in balancing the roles of employer and employee. The keys to Human resources management (HRMp) are staffing, training and development, compensation and reward, safety and health conditions, performance appraisal, and employee involvement. These practices help employers and employees achieve organizational success [1] and increase productivity. By providing these practices it will enhance employee engagement. Employee engagement contributes to their professional responsibility and the overarching organization. Employees who are genuinely engaged automatically display higher motivation, productivity, and a greater propensity to extend their effort in the organization's achievements. Organizations need to align HRMp to ensure employee engagement and prevent turnover. In addition, to achieve organizational success, organizations' support from employers is compulsory to supply employees with appropriate practices such as an inclusive environment [2], HRMp [3]. Therefore, this study examines the relationship between human resources management practices (HRMp) and employee engagement among Staff at UPM Sports Centre.

II. Methods

Forty (40) respondents were involved in this study (male = 30 and female = 10) from UPM Sports Centre with a working grade from 11 to 48. This study used probability sampling which is simple random sampling and Statistical Analysis Software (SPSS) to analyze data. This study utilizes a questionnaire on Human Resource Management Policies and Practices, which has a Cronbach's alpha of 0.84, and the Utrecht Work Engagement Scale (UWES), with a Cronbach's alpha of 0.8. Both questionnaires employ a Likert scale for responses. The inferential analysis employed is the Pearson correlation coefficient to examine the relationship between human resources management practices and employee engagement among staff in UPM Sports Centre with a significant value established at 0.05.

III. Results and Discussion

In this study, the results of the Pearson recorded positive correlation test between human resource management practices (HRMp) and employee engagement are statistically significant, $r = 0.662$, $p = 0.001$. The results of this study indicate an employee exhibits greater dedication ($m = 4.25$) when an employer provides them with a good performance appraisal ($m = 3.96$). This aligns with the previous findings that HRMp significantly influences and enhances employee engagement [4]. It contributes to various employee career development including performance development, performance feedback, job security, training, and rewards that play an important role in fostering employee engagement [4]. In addition, in the sports field, the findings revealed HRMp did influence organizational performance, especially in athletes' performance [5]. Therefore, it can be inferred that the attainment of a prestige performance is intrinsically linked to employee engagement particularly employees' dedication and human resources management practices in performance appraisal notwithstanding their field-related workload.

TABLE 1
RELATIONSHIP BETWEEN HUMAN RESOURCES MANAGMENT PRACTICES AND EMPLOYEE ENGAGEMENT

		Employee Engagement
Human Resources Management	Pearson Correlation	0.662**
	Sig (2-Tailed)	< 0.001
	N	40

Note: $p < 0.05$, $N = 40$

IV. CONCLUSIONS

This study concluded employers must implement human resources management practices to enhance employee engagement. Through this implementation, employees will likely perceive a sense of belonging to the organization, contributing to their productivity and organizational objectives.

ACKNOWLEDGMENT: We express our gratitude to the UPM Sport Centre respondents who genuinely engaged in this study.

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The Relationship Between Physical Activity and Family Support Among School Students at Negeri Sembilan

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Abstract | This study aimed to investigate the relationship between family support and physical activity among school students at Negeri Sembilan. The sample of this research is the school's students at Negeri Sembilan. This study involves 464 respondents (256 = male,208 = female). There are three sections to the questionnaire. Section A, demographic; section B, physical activity questionnaire for adolescents; and Section C, activity support scale for multiple groups. The data analysis method used for the first and second research questions was descriptive analysis. For the third research question, the relationship between physical activity and family support among school students at Negeri Sembilan was using Pearson's Correlation.

Keywords: *Physical activity, PAQ-A, family support, ACTS-MG.*

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I. INTRODUCTION

Physical exercise is very important today, as it not only reduces the risk of chronic illnesses but also improves an individual's general health [5]. Physical exercise boosts the immune system, possibly lowering the incidence of communicable illnesses such as bacterial and viral infections [3]. Nonetheless, powerful technological advancements have resulted in a considerable decrease in physical activity in modern lives, directly contributing to the growth of several noncommunicable illnesses such as diabetes, cardiovascular disease, and obesity [3]. Moreover, children who do not participate in physical exercise miss out on the beneficial social and emotional benefits that may be achieved, such as increased self-esteem, decreased anxiety, and reduced stress [4].

Families have an important role in shaping a child's physical exercise behaviour by encouraging active participation [1]. In the home, parental assistance allows parents to bridge the physical and psychological distance between themselves and their children. This help includes advice for children who need aid with their behavioural, social, and intellectual development. To promote their children's participation and align with personal goals, parents commit to continually encouraging, evaluating, and inspiring them [5]. These aspects affect and influence students' engagement in sports and physical activities [5]. Certainly, parents not only accompany their children to the competition place but also remain there, demonstrating their potential effect on the kid and their behaviour in a variety of situations [2].

II. METHODS

A quantitative research design was used in this study by using the survey method. For this study, the population refers to school students in Negeri Sembilan who are in primary school. The Statistical Package for Social Science (SPSS) version 28 was used for analysing all the data. The questionnaire consisted of three sections. The first section was the demographic profile of respondents, followed by the Physical Activity Questionnaire for Adolescents (PAQ-A). Moreover, the next section was the Activity Support Scale for Multiple Groups (ACTS-MG). There were four factors or domains that were accessible in the questionnaire, which were logistic support, modelling, use of community resources, and restricting access to sedentary activity. In addition, the hypothesis was tested using Pearson Correlation.

III. RESULTS AND DISCUSSION

The correlation analysis showed a weakly correlated relationship between family support and physical activity ($r = 0.271$, $p < 0.05$). Thus, the null hypothesis was rejected because there is a significant relationship between physical activity and family among school's students at Negeri Sembilan.

TABLE 1
CORRELATION BETWEEN FAMILY SUPPORT AND PHYSICAL ACTIVITY

		Family Support
Physical Activity	Pearson's Correlation	0.271**
	Sig. (2-tailed)	0.001
	N	464

*** 0.05 level (2-tailed)*

IV. CONCLUSIONS

In conclusion, a body of previous research has emphasized the critical importance of physical activity in promoting health and well-being. According to studies, adolescents who do not have sufficient familial support are less likely to engage in physical activity. Studies have found that adolescents' levels of physical activity are directly connected to the support they receive from their families, such as encouragement, involvement in joint activities, and positive comments on their performance.

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Exploration of Football Fanaticism Among Aremania Supporters After the Kanjuruhan Tragedy

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Abstract | This research will explore the fanaticism of Aremania as one of the football supporters in Indonesia who has experienced the Kanjuruhan tragedy. This research aims to explore the level of Aremania fanaticism after the Kanjuruhan tragedy, which refers to the four supporter quadrants. Apart from that, knowing the form and level of fanaticism of Aremania supporters. Later we will focus on the level of fanaticism from various aspects of the approach. This research approach is a qualitative approach that looks at social problems using certain conceptual and theoretical approaches. Data collection techniques consist of observation, interviews, and documentation. Data analysis was conducted through several stages, namely data collection, data reduction, data presentation, and conclusion. The research results are based on the data obtained, there are four supporter's quadrants which are grouped into supporters, flaneurs, fans, and followers. (Supporters) have become Arema supporters more since childhood, (Flaneurs) most of the respondents buy tickets or jerseys to help the club finances, (Fans) have become Arema Fans mostly starting from television and Aremania attractions at the stadium, (Followers) Most respondents know Arema more from their parents and close friends. The results of the research show that there are several themes, including 1) the story of becoming Aremania, 2) the positive and negative sides of Aremania, 3) experiences at the location of the Kanjuruhan tragedy, 4) important lessons from the Kanjuruhan tragedy, 5) Changes in fanaticism, 6) The future Indonesian football, 7) regulations on the use of tear gas, 8) manifestation of being Aremania, 9) sacrifice of being a supporter, 10) interest in supporting Arema Fc.

Keywords: *Kanjuruhan disaster, fanaticism supporter, Aremania.*

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I. INTRODUCTION

Football is a sport that is popular in various parts of the world, including in Indonesia. The popularity of football has many fans who call themselves football supporters and can consist of various ages. In Indonesia, football also has quite a lot of fans, and they have various supporter bases. one of them is Aremania. The history of Aremania begins with the emergence of a club in Malang City, namely Arema FC, which was founded on August 11, 1987. However, at that time, Aremania was still a minority among the Malang community and was not an official supporter of the Arema FC club. At its inception, Arema FC supporters did not have a name in the name of Aremania. Long before the name Aremania appeared, in Malang City, it was recorded that many gangs were roaming around at that time [1]. On October 1, 2022, the world of football experienced a heartbreaking event in the match between Arema FC vs Persebaya Surabaya in the BRI LIGA 1 2022/2023 at the Kanjuruhan Stadium. The Kanjuruhan tragedy occurred because it was suspected that the home supporters from the AREMA FC team could not accept the defeat wholeheartedly. As a form of disappointment, some of Aremania entered the stadium field by force and slightly damaged some of the facilities on the side of the field, triggering emotions from the police to fire tear gas into the field and over the spectator stands. The aim of firing tear gas by the police was to quell the riots that occurred. The Kanjuruhan tragedy invited a lot of concern and sympathy from various corners of the world, especially the world of football. Foreign media also reported news of the second dark tragedy in the world of football [1].

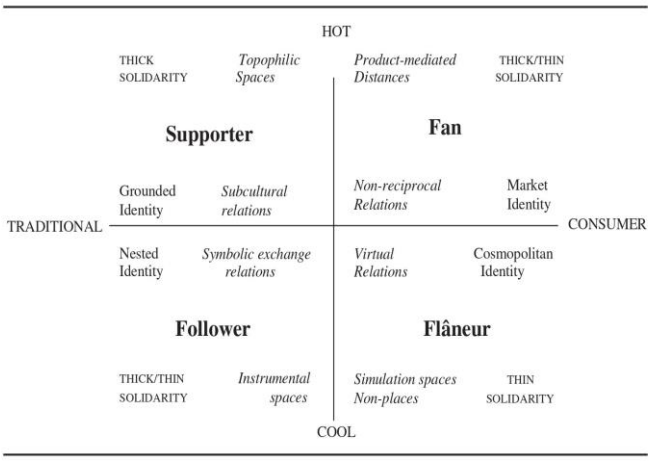

Fig.1 Four supporter quadrant

This supporting theory is the theory proposed by [2]. There are four supporter quadrant categories supported by two basic binary oppositions: hot – cool and traditional – consumer. There are four quadrants where the audience can be classified into Supporters, Followers, Fans, Flaneurs. Traditional/hot, traditional/cold, consumer/hot. The four quadrants represent categories of ideal types through which we can map the historical changes and cultural differences experienced by specific spectator communities in their relationships with identified clubs. The traditional/consumer horizontal axis measures an individual's investment base in a particular club. Traditional audiences will have a longer, more local, and popular cultural identification with the club. Meanwhile, consumer fans will have a more market-centered relationship with the club as reflected in the centrality of consuming the club's products. The hot - cold

vertical axis reflects the different degrees to which the club is the center of individual self-formation projects. The hot form of loyalty emphasizes an intense type of identification and solidarity with the club. The hot form suggests the opposite [2].

This research was conducted to find out whether there was a shift in Aremania/Aremanita fanaticism, how the Kanjuruhan tragedy affected the fanaticism of Aremania/Aremanita supporters after the Kanjuruhan tragedy and to find out the form of fanatic behaviour shown by Aremania/Aremanita supporters before and after the Kanjuruhan tragedy. This research tries to explore Aremania/Aremanita fanaticism after the Kanjuruhan tragedy through four supporter quadrants which include supporters, fans, fleneurs, and followers. Several challenges that respondents may have felt while being Aremania/Aremanita at the stadium, especially when they were at the location of the Kanjuruhan tragedy. Barriers felt by several respondents include trauma, fear, and others. Therefore, research on exploring Aremania/Aremanita fanaticism after the Kanjuruhan tragedy will be useful for understanding the level of fanaticism through the four supporter quadrants. This research is important because it can be a reference solution for Aremanita/Aremania supporters in overcoming challenges and obstacles after the Kanjuruhan tragedy.

II. METHODS

This research uses a qualitative descriptive research method to describe Aremania fanaticism after the Kanjuruhan tragedy through four supporter quadrants. In conducting data analysis, researchers used the data analysis study concept from Miles and Huberman which consists of four categories, namely data collection, data reduction, data presentation, and concluding. Researchers use primary data which directly through interviews and direct observation leads to primary sources of active individuals without intermediaries.

This research was conducted in various regions, especially Malang City. This research instrument was used semi-structured for 10 Aremania/Aremanita respondents. The interview results were then processed by coding the interview transcripts in detail and in detail. Then coding grouping was conducted and the results were described into coding groupings [3]. The results of the coding grouping will form a theme [3].

The research instrument uses detailed interview guidelines, namely interviews are a communication process with respondents to obtain predetermined information [4].

The data collection steps are as follows: 1) Prepare questions for respondents: guide to research interview questions. 2) Interviews with Aremania/Aremanita respondents: interviews were conducted with the aim of collecting the necessary information. 3) Interview transcription process: in transcribing respondent interviews, the interviewer first listens to what the resource person or respondent has to say and writes the words in detail. This transcription process is conducted after the interview. 4) Active transcription coding: coding of interview data is conducted on sentences that are in accordance with the four supporter quadrant themes determined by the interviewer. 5) Coding grouping: interview transcripts are given several codes one by one, then the interview transcripts are grouped according to the appropriate theme or the same theme. 6) Description coding themes: the interviewer succeeded in describing several themes that had been determined and related to the four supporter quadrants.

In this research, there are several research streams conducted by researchers to conduct research. Data collection for this research was conducted in Malang City and outside Malang City from 4 September 2023 to 4 May 2024.

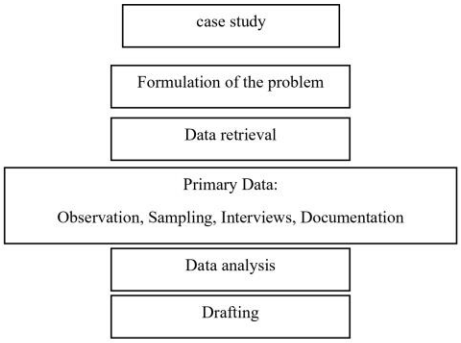

Fig.2 Research flow diagram

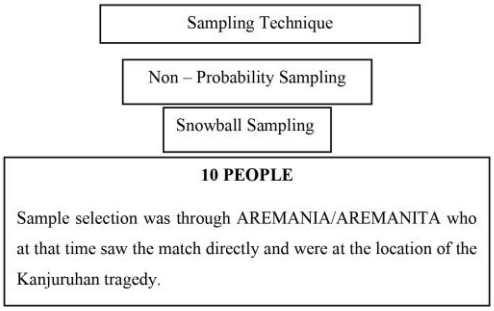

Fig. 3 Sampling selection flow diagram

III. RESULTS AND DISCUSSION

The results of data processing use analysis of several themes that can be presented in respondent interviews. There are several themes from the four supporter quadrants that emerge related to the experiences of Aremania/Aremanita respondents and are presented with analytical descriptions.

Aremania is a type of supporter who has a high fanatical spirit with other supporters. Several respondents also agreed that they were Aremaniacs or Aremanita. Nothing more than that they also expressed several different opinions and answers during the interview session. Based on several factors, all respondents have had a supportive spirit since childhood, whether it be from family ties or the influence of social media. Some of the respondents at that time also experienced the heartbreaking tragedy that occurred in Indonesia and all the respondents were present at the match held on October 1, 2022, which brought together the AREMA FC VS PERSEBAYA SURABAYA teams at the Kanjuruhan Stadium, Malang Regency. From the various questions given by the interviewer, there were many significant differences in the answers from the respondents and overall, from the respondents themselves. The interviewer here refers to four supporter quadrants, including supporters, flaneurs, fans and followers. Each respondent's answers to several questions were different.

A. Supporter/Supporter 1

This theme discusses the story of becoming AREMANIA, of all respondents answered that most of them came from family factors, especially their father who was also an Aremaniac who was also a supporter, but some respondents also did not answer from family factors but from Aremania supporters themselves who were role models. from supporters in Indonesia with their classy actions when supporting the AREMA FC team. In terms of supporting the AREMA FC team. "AF: If you ask how long, it has been around since birth. What is the term? Yes, parents also like it. So, from the start, I already though, what is the name of a ball, what is the name of an Arema? Yes, even when I was in elementary/middle school, it was already nearing exam days. Once I went on a tour to Solo. The next day it was an exam. Then the one who went to Lamongan was in elementary school, grade 6. Lastly, yesterday I went to GBK, GBK Jakarta, it is tryout season for grade 3 junior high school. If you go to Solo, it is exams and practice, if I am not mistaken, then after that, maybe since I was little, because my parents like it too and me personally.

One of the male Aremania respondents with the initials AF, aged 19 years from Singosari, Malang Regency, said that he became an Aremaniac since and when the respondent was still in junior high school/elementary school. The respondent also answered and said that he had seen AREMA FC tour to Manahan Solo at that time and at the same time as the exam the next day. On the other hand, the respondent had also toured Lamongan during his elementary school class on the day of the exam the following day. This respondent named AF is also still consistent today in supporting the AREMA FC TEAM.

"BGS: It's been a long time, bro, as a supporter. Yes, as I said earlier, if you count how long it takes, that is, every person born on the earth of Aremania has become an Aremania, but when will that be, perhaps for me, for example, maybe in 2005-2006, I will have started to grow a sense of love, a sense of pride. it might not have been at that time, but if you ask, the feeling of love and pride has started to grow, namely in 2005-2006, like that, sir, so yes".

A male Aremania respondent with the initials BGS, 30 years old from Karangploso, Malang Regency, has been an Aremaniac since 2005/2006. The respondent's statement was also remarkably interesting, saying that Mas Bagus had started to develop a feeling of love for the AREMA FC club since winning the 2006 Copa. The respondent with the initials BGS also said that every child born in Malang was obliged to become a Malang Arek or commonly known as AREMA, especially from childhood.

B. Supporter/Supporter 2

This theme discusses the positive and negative sides of Aremania which are included in the quadrant theme. The supporters also have different thoughts from each respondent when the interviewer conducts an interview. Each respondent has more similarities on the positive side, including positive answers regarding cooperation between Aremania and supporters. other things, fundraising and others, according to the total number of respondents, there is more, but there is the opposite according to respondents, which is a pro and con for the negative. Some respondents answered that because of the negative, according to Aremania supporters, they often sing racist songs while in the stadium. It is common for one of the respondents to say this boldly. that Aremania is looking for unrest when playing outside their home base. Apart from that, from this question session, respondents made it clear that the riots occurred between Aremania and opposing supporters who at that time were competing against the AREMA FC team.

"BM: The positive side is when Aremania raises funds and men.

C. Research Weaknesses

This research has several weaknesses due to the limitations of the researchers. Based on research conducted by the author, several shortcomings and weaknesses were found in this research. The shortcomings and weaknesses of this research can be a lesson for future writers and researchers who will further refine their research results. The weaknesses of this research include: 1) In the data collection process, 10 Aremania/Aremanita respondents conducted this research, some of whom did not fully understand this research. When the researcher asked several interview guide questions, some respondents could not digest them properly. 2) During the data collection process, some respondents whose names were not listed in the official respondent book refused because they felt that an interview with the researcher could spread themselves to social media. So, researchers have difficulty in finding respondents who have the courage during the interview session. 3) Researchers in the data collection process also have obstacles starting from traveling with unpredictable weather and sometimes some respondents are still at the work location, so the data collection process does not match the researcher's plan.

D. Research Advantages

This research has several advantages. Based on research conducted by the author, there are several advantages of this research, including: 1) Collecting research data, researchers not only conduct interview sessions, but researchers also conduct observations at the respondent's location, so that accurate data is obtained, 2) Interview sessions are conducted by researchers and carried out with respondents in a quiet place so that accurate data is obtained through a voice recording device, 3). In the future, it is hoped that this research can become a reference solution for Aremanita/Aremania supporters in overcoming challenges and obstacles after the Kanjuruhan tragedy.

IV. CONCLUSIONS

Based on research conducted on 10 AREMANIA/AREMANITA respondents from outside the city and Malang City based on four quadrants of supporters, it was concluded that the fanaticism of Aremania or Aremanita after the Kanjuruhan tragedy, of the total number of respondents, fanaticism was still quite high by buying merchandise even though they did not see it directly. and the small number of respondents who still choose to step aside are either disappointed by the club they support or vice versa. Respondents who felt disappointed due to numerous factors felt less satisfied with the sense of injustice from the Kanjuruhan tragedy.

Initially, the 10 Aremania/Aremanita respondents also felt traumatized by the Kanjuruhan tragedy and difficulties in supporting the Arema FC team. Gradually, all respondents will get rid of the trauma in their way through positive activities and later the time will come when respondents return to the stands and see the AREMA FC team competing at the Kanjuruhan Stadium, Malang Regency.

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Transformational Leadership Behaviour and Group Cohesion Values in the Outdoor Recreation Program Among Sports Science and Recreation Students

Siti Sarah Khairul Anuar* and Ahmad Fikri Mohd Kassim.

Abstract | This study aims to explore the relationship between transformational leadership behavior and group cohesion values in the outdoor recreation program curriculum among Sport Science and Recreation students. The four main components are employed to define the idea and style of transformational leadership: idealized influence, intellectual stimulation, inspirational motivation, and individual consideration. A transformative leader must exhibit idealized influence by demonstrating exemplary behavior. It is vital that leaders provide inspirational motivation to encourage followers to be committed to the organization's objectives. Moreover, intellectual stimulation involves fostering innovation, creativity, critical thinking, and problem-solving. Individualized consideration entails the leader addressing the unique needs of each follower, acting as a mentor or coach. Group cohesion pertains to the affirmative connection and feeling of inclusion among the group members. It transcends mere relational dynamics, encompassing a nurturing and supportive group atmosphere, empathetic comprehension, and acknowledgment. A total of 230 participants (120 male and 110 female) volunteered and completed the questionnaire. The survey employed the Multifactor Leadership Questionnaire (MLQ) 5x-short and the Group Environment Questionnaire (GEQ) to assess the elements affecting transformational leadership and the significance of group cohesion in the research. The findings demonstrated a significant correlation between (i) the factors of transformational leadership (such as idealized influence, intellectual stimulation, inspirational motivation, and individual consideration) and individual attraction to the group task (ATG-T), (ii) the factors of transformational leadership and group integration task (GI-T), and (iii) transformational leadership with ATG-T and GI-T. In summary, the potential of transformational leadership to improve the coherence of groups involved in outdoor recreation educational activities is remarkable. By employing transformational leadership, individuals holding leadership roles are empowered to effectively promote and encourage cooperation towards a common objective, thus fostering a sense of unity and cooperation among group members.

Keywords: *Group cohesion, outdoor recreation, transformational leadership, values.*

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I. INTRODUCTION

Outdoor recreation may be any activity that demands physical and mental strength, such as whitewater kayaking, rock climbing, skiing, mountaineering, and many more [1]. Transformational leadership is the process by which a leader develops group or organizational performance that exceeds expectations under a deep emotional relationship with his or her followers and a collective commitment to a higher moral purpose. The transformational leadership concept and style are defined by four major characteristics. Idealized influence can be defined as transformational leaders modelling ethical behaviour. Their moral conduct earns a necessary level of respect and trust. This can help leaders steer decision-making that works to improve the entire organization. Meanwhile, inspirational motivation is a transformational leaders can articulate a unified vision that encourages team members to exceed expectations. Intellectual stimulation is transformational leaders regularly challenge assumptions, take risks, and solicit team members' input and ideas. Individualized consideration is the transformational leaders listen to employees' concerns and needs so they can provide adequate support. Cohesion can be described as the strength of bonds between group members, the unity of a group, the sensation of attraction between group members, and the degree to which members concentrate their efforts to attain collective goals are all examples of group cohesiveness. There are four subscales of group cohesion. Individual Attraction to the Group Task (ATG-T) is to assess an individual group member's participation in the group task productivity, goals, and objectives. Besides that, Individual Attraction to the Group Social (ATG-S) is to assess individual group members' perceptions of their personal involvement, acceptability, and social interaction with the group. Moreover, Group Integration-Task (GI-T) assesses individual group members' perceptions of similarity, closeness, and bonding within the group as a whole about its goal, and Group Integration Social (GI-S) assesses individual group members' perceptions of similarity, closeness, and bonding within the group as a whole in terms of social factors. This paper aims to investigate the associations between transformational leadership behaviour and elements in group cohesion values in the outdoor recreation program curriculum at the Faculty of Sports Science and Recreation in UiTM.

II. METHODS

The data was collected using questionnaire surveys. The total of participants is 230 respondents (120 male and 110 female). To evaluate transformational leadership, this study uses the adapted Multifactor Leadership Questionnaire (MLQ) 5x-short developed by [2], consisting of twenty questions. While a study developed a Group Environment Questionnaire (GEQ) [3] to evaluate group cohesion. This questionnaire consists of eighteen questions. Some criteria will be imposed in selecting the samples. Inclusion criteria needed using Outdoor recreation students from the Faculty of Sports Science and Recreation of UiTM Shah Alam, Puncak Alam, Seremban, Jengka, and Arau branch, and students who know outdoor recreation and take the subject of SMG 161 and SRT 451. While for exclusion are none of the outdoor recreation students from the Faculty of Sports Science and Recreation of UiTM Shah Alam, Puncak Alam, Seremban, Jengka, and Arau branch, and students who do not take the subject of SMG 161 and SRT 451.

III. RESULTS AND DISCUSSION

The results of this paper are there was no significant correlation between transformational leadership and group cohesion. However, there was a weak significant correlation between variables of transformational leadership (idealized influence, intellectual stimulation, inspirational motivation, individualized consideration) and individual attraction to the group task (ATG-T) and group integration task (GI-T). There was a negative and weak significant correlation between transformational leadership and ATG-T. Therefore, there was a positive and very weak significant correlation between transformational leadership and GI-T.

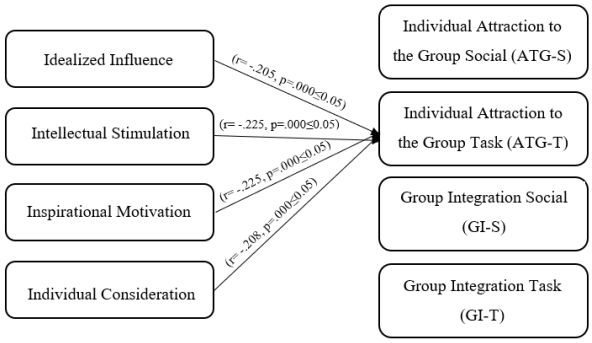

Fig. 1 Correlation between variables transformational leadership and ATG-T

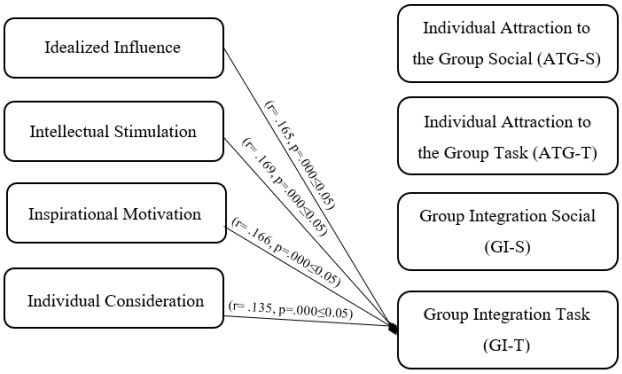

Fig. 2 Correlation between variables transformational leadership and GI-T

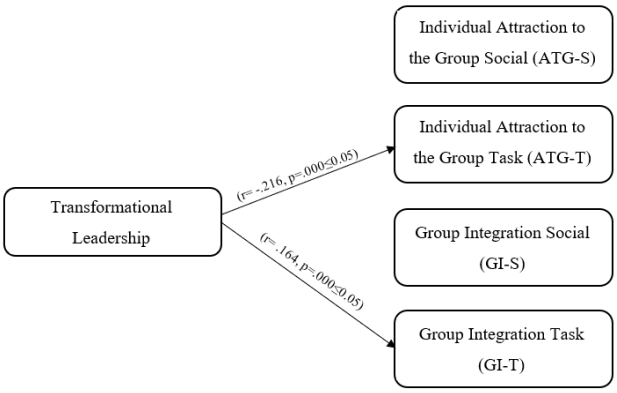

Fig. 3 Correlation between transformational leadership and variable of group cohesion

The findings of this study imply a lack of significant association between transformational leadership and group cohesion. Some transformational leaders demonstrate a lack of positive role modelling for their followers, while others are unable to address unfamiliar problem-solving scenarios effectively. This result can be supported by a past study [4], the authors found that leaders need to rethink their perceptions of applying more transformational kind of leadership when necessary or working harder to achieve corporate success and boosting their collaboration level.

IV. Conclusions

The capacity for transformational leadership to enhance the cohesion of collectives engaged in outdoor recreation curriculum endeavours is noteworthy. Through a transformational leadership style, individuals in leadership positions are empowered to effectively encourage and stimulate collaboration towards a shared goal, consequently nurturing a feeling of solidarity and teamwork among group members.

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